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UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

NATIONAL FOREST SCALING HANDBOOK

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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

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NATIONAL FOREST SCALING HANDBOOK

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SCALING AND MEASUREMENT OF NATIONAL FOREST TIMBER

This handbook contains instructions for the scaling and measurement of timber cut on the national forests. These instructions are supplemental to the National Forest Manual and will be followed in the administration of timber sales, timber trespass investigations, free use, and administrative use. Uniform standards and methods are necessary in all national-forest work involving the measurement of timber. These instructions must be followed strictly by all forest officers.

Unless timber is sold by tree measurement, it must be scaled, counted, or measured before it is removed from the cutting area or from the designated scaling place.

REGULATION ON SCALING

The regulation of the Secretary of Agriculture on scaling national-forest timber is as follows:

Reg. S–16.[1] No live tree shall be cut under any timber-sale contract or permit until marked or otherwise designated for cutting by a forest officer.

The volume of national-forest timber in a sale may be determined by scaling, measuring, or counting the logs or other products, or by measuring the trees before cutting. If the contract provides for the determination of volume by tree measurement and the timber has been paid for, the stamping of the tree authorizes cutting and removal. Otherwise no timber cut under any contract shall be removed from the place designated until it has been scaled, measured, or counted and stamped by a forest officer, unless such removal is specifically authorized in the agreement.

No person except a forest officer shall stamp any timber belonging to the United States upon a national forest with the official marking ax or any instrument having a similar design.

[1] Superseded by Reg. S–15, December 1948.

National forest timber sold on scale shall be scaled by the Scribner decimal C log rule, or, if the advertisement and agreement or permit so state, by the International ¼-inch log rule or by the cubic volume rule, each as used by the Forest Service.

AUTHORIZED LOG RULES

The Scribner decimal C log rule is the standard for Forest Service sawlog scaling. This log rule will be used unless the avdertisement and agreement specify either the International ¼-inch log rule or the cubic foot log rule. (See Reg. S–16, p. 1.) In view of the present limited use of the International ¼-inch and cubic foot rules, in Forest Service scaling, the discussion which follows will refer only to the use of the Scribner decimal C log rule except for the instructions in using the other two rules given on pages 42 to 46 and 49 and 50.

The Scribner decimal C log rule drops the units and gives the contents of a log to the nearest 10 board feet. One cipher added to the sum of the numbers read from the scale stick gives the total scale of the log, except in the case of 6-inch logs, 6, 7, 8, and 9 feet long, and 7-inch logs 6 feet long. The reading for these is 0.5, which, multiplied by 10, gives 5 feet as the actual scale.

Scale sticks for logs of even lengths are furnished in 30-, 36-, 48-, 60-, and 72-inch lengths.

In the absence of a scale stick, or where the position of logs in the pile makes its use difficult, diameters and lengths may be measured and the scale figured from a table later, fair allowance being made for defect.

Table 1 in the appendix gives the contents of even-length logs 8 to 40 feet long, as well as the values of odd-length logs of 9 to 17 feet, and the diameters of 6 to 120 inches. One cipher must be added as with the scale stick.

Table 2, appendix, which may be used for scaling veneer bolts, or other short logs, shows the contents of logs 2 to 8 feet long by 1-foot classes, of diameters of 8 to 40 inches. One cipher also must be added to each value in this table.

FOREST OFFICER DEFINED

Regulation S–16 provides that a forest officer shall mark or designate live trees for cutting; scale, measure, count, and stamp timber before it is removed by the purchaser. It specifically prohibits the stamping of any timber belonging to the United States by any person other than a forest officer.

The obvious intent of the Secretary of Agriculture in promulgating this regulation was to prevent unauthorized use of the marking ax by a timber sale purchaser or his agent. The term "forest officer," as used in Regulation S–16, means any Government employee assigned to the job by competent authority.

POLICY

THEORY OF SCALING

Scaling is the measurement of logs by a unit of measure called a log rule. A log rule is a table intended to show the amounts of lumber which may be sawed from logs of different sizes under certain assumed conditions. There are many log rules extant, because various interested persons have devised or revised rules in efforts to get the closest possible approximation of the volumes of lumber obtainable from logs of different dimensions under the conditions in specific localities. At best, it is only possible for a log rule to approximate manufactured volume, because of constant changes in markets, machinery, sawing practices, etc., and even the varying skill of individual sawyers. Thus a log rule becomes an arbitrary unit of measure. *Its application is not to be varied according to the mill in which the logs are to be sawed.* The scaled volume of a given lot of logs, derived by using a particular log rule, should be independent of variations in manufacture, such as whether the mill cuts chiefly boards or timbers; uses a thin bandsaw or a heavy circular; has a skillful or a wasteful sawyer; slabs light or heavily; saws for grade or quantity; saws scant or over thick; produces lumber with wane on the corners or must meet strict specifications.

There will, therefore, be an overrun or an underrun, on the average, when logs are scaled by a particular rule in

a given locality, to be sawed by mills of any one general type. Possibly due in part to the influence of hidden defects in large logs, it is generally recognized that overrun decreases, and may even become an underrun, with increases in the diameter of the average log. Experience shows this to be true even for the International ¼-inch rule, although not to the same degree as for the Scribner decimal C rule. This fact does not change scaling practice. Overrun or underrun are estimated in the process of appraising national forest timber for sale, and presumably by the purchaser in determining the prices which he will bid, but in both cases the assumption is that the logs will be scaled by the log rule stated in the sample agreement, *applied under the standard scaling practices described in this handbook.*

CUSTOMARY COMMERCIAL UNITS USED

National-forest timber is appraised, sold, and measured by the customary commercial units for the product involved. As a standard practice, the volume of sawtimber (usually including veneer—or large cooperage—bolts) will be determined by the board-foot log scale; hewed railroad ties by the piece of stated minimum size; mining timbers by the piece or linear foot; telephone poles and piling by the linear foot, or by the piece of stated length; pulpwood by the solid cubic foot, or by the cord; and fuel wood, shingle bolts, and similar material by the cord. Other units may be used when better adapted to local trade customs, but it is the policy of the Forest Service to measure timber products in the form in which they leave the woods and not on the basis of the amount of finished product which may later be manufactured from them. Exceptions to this policy may be made, as when ties are being sawed in places where the possible side cuts cannot be marketed, if advantageous in national forest administration, but such cases are rare. The policy applies to products ordinarily finished for the market at the stump, such as telephone poles, piling, fence posts, or pulpwood, which are, therefore, counted or measured, in the tree or after cutting, in terms of the trade products.

SCALING PRINCIPLES

Scaling, as practiced by the Forest Service, is the measurement of sound material in the log and relates to quantity rather than quality of material. Timber will therefore be scaled in accordance with the defect in the log and not in relation to any particular grades of lumber it will produce.

Scaling sound contents in the log rather than material of certain lumber grades is the standard practice of the service for the following reasons:

(1) The unit of measure is regarded as more stable, with less fluctuation from year to year, than where lumber grades are followed. Greater certainty is thus assured purchasers as to what material they will be required to pay for throughout the life of their contracts.

(2) The basis of scaling is less subject to individual judgment. It is learned more readily by scalers and more uniformly applied, and hence is more practicable as a common standard for a large number of scalers in timber of varying size and quality.

(3) Mill tallies are not required for effective application of the scale or to settle complaints by purchasers. The obligation to check the scale by mill studies, which is implied in scaling to certain lumber grades, is avoided. The accuracy of the scale is directly and inexpensively determined by a check on the logs themselves.

Log grades, as distinct from lumber grades, may be recognized in timber-sale contracts, and in scaling practice. This may be particularly desirable where log grades have been defined and are used locally as the basis of payment for logs delivered to established log markets. Specifications for distinguishing the various grades must be definite enough so that logs may be graded readily at the time of scaling. Perhaps the sale and scale of national-forest timber by log grades may be applied to high quality hardwood logs, such as veneer stock, in advance of more general use. Regional foresters will issue appropriate instructions for the application of this principle where such action is deemed advisable. It is important that log grades be based on recognizable characteristics of the logs and that

it be understood that the sale of timber by log grades does not guarantee nor imply that specific grades of lumber can be manufactured from such logs.

USE OF MILL CHECKS

Proficient scaling requires a knowledge of how timber "cuts out." The best way for a scaler to acquire skill in making deductions for particular kinds of defects is to see how defective logs open up on the saw carriage and to note the actual loss caused by the defect. The scaler must keep in mind that the purpose of such observations is to improve his judgment as to loss caused by specific defects. Visual checks usually will suffice, since it is not the purpose to make a study of total or grade recovery.

In training and instructing scalers, in check scaling, settling complaints, in discussing proposed sales, and in other matters of scaling practice, scaling to include certain grades of lumber and exclude other grades will be avoided as far as practicable.

DEFECTS TO BE CONSIDERED IN SCALING

Log defects include rot or any defective or waste material caused by crooks, checks, shake, or other features which actually reduce the amount of sound usable material in the log. The most common forms of defects which affect the yield of lumber are rot, shake, check, pitch ring, cat face, ingrown bark, and wormholes. Other and less common forms of defect which affect the yield of lumber and for which deductions may be authorized by the regional forester, according to the actual local merchantability of the material are—

(1) Massed black or red pitch, commonly found in badly fire-scarred butt logs of pine and Douglas fir.

(2) Large knots so clustered or so close together in top logs that they reduce the grade of the logs below what is recognized as merchantable.

(3) Blackheart, mineral streak, and spiral grain in hardwoods.

Ordinarily, sound knots, slightly pitched butts, and discoloration affect the quality and not the yield of lumber produced and will not be recognized as defects in scaling.

In Forest Service scaling, deductions will not be made for defects outside of the right cylinder (a cylinder whose

sides are at right angles to the top and base; see fig. 2) represented by the top end and total length of the log, or for defects in the portion of the log which will be slabbed off. Material obtained outside the cylinder is part of the overrun and is taken into account, together with overrun from other sources, in fixing the price of the timber. For this reason overrun should not affect the scale in any manner or influence the scaler in making deductions.

Otherwise, deductions will be made for all visible defects which will actually reduce the sound material in the log. There must, however, be an unmistakable surface or end indication of the defect. The scale should never be reduced simply because the timber is known to be more or less defective, or because hidden defect frequently appears in sawing.

In applying the foregoing, the loss will be those portions of the boards from the cylinder which must be trimmed off because of the defect, provided that the remainder of each board has at least the minimum length manufactured from the species in standard milling practice in the region and is at least 4 inches wide. If the remainder of any board is shorter or narrower than these limits, the entire board will be considered lost.

The methods of manufacture of particular purchasers will not be taken into account by scalers. No attempt should be made to adjust the scale to losses due to poor equipment, inefficient methods, the sawing of extra thicknesses, nor to catch up gains from exceptionally close utilization. It is the scaler's function to determine the amount of sound material in the log as uniformly as possible, whatever the mill tally may be.

MILL OVERRUN

In making mill checks or more intensive "mill studies," it is of course desirable to compare the total cut of all merchantable grades of lumber with the log scale under the standard Forest Service method, thus determining the overrun.

Mill overrun is made up of—

(1) Any saving in saw kerf under one-fourth inch, the kerf upon which the scale rule is based.

(2) The saving in kerf from cutting dimension stock, timbers, and other material over an inch thick.

(3) Trade practice in cutting lumber of scant thickness.

(4) Utilization of narrow widths in slabbing, not included in the diagrams upon which the Scribner scale is based.

(5) Utilization of short lengths from the swell of logs, not included in the Scribner diagrams.

(6) Utilization of lumber grades which admit considerable unsound material, rot, broken-down sap, etc., which should be eliminated in the scale.

Deductions are made for all visible unsound defects within the right cylinder, although lumber grades containing considerable amounts of such defects are marketable in some localities. Good scaling under Forest Service standards thus should yield an overrun equivalent to the greater part of the cut of grades which contain considerable quantities of unsound defect, in addition to the normal overrun on sound logs.

ASSURANCES TO PURCHASERS

The average percentage of overrun or underrun which has resulted in sales of similar timber in the locality should be discussed with timber sale applicants. This must be expressed as an average and accompanied by a plain statement that the Forest Service regards the amount of overrun obtained by an individual purchaser as being chiefly in his control. The furnishing of such information must not convey any direct or implied guaranty of any overrun in a specific sale, either made or proposed. *Assurances or promises of the amount of overrun which will be obtained in a sale must never be given.*

Purchasers should be told that—

(1) The logs will be scaled by the Scribner decimal C rule on the basis of the sound material in them. The Forest Service practice of reading diameters to the nearest, instead of the next lower, inch should be made clear, together with the requirements governing maximum scaling length, trimming allowance, and penalty for overrunning the trimming allowance.

(2) The Forest Service makes systematic checks of local scales by more experienced scalers of special com-

petency, to obtain as uniform scaling practice as possible.

(3) The Forest Service will make special check scales by the best men in its organization in case of apparently well-founded and serious complaint, and will adjust the scale according to the results of such a check scale if required to correct serious errors *in the application of these scaling instructions*, but not for other causes, such as failure of the purchaser to make as much profit as he expected.

DEFINITION OF MERCHANTABLE LOGS AND PRODUCTS

Every timber-sale agreement should define exactly the material to be classed as merchantable under its terms. Exceptions to this rule may be made only in small sales where satisfactory standards of utilization have been established. In sales of sawlogs this definition will consist of—

(1) The minimum length of merchantable logs.

(2) The minimum diameter at small end.

(3) A minimum percentage of the gross scale of the log remaining after deductions for defect (see merchantability clause, Form 202, Timber Sale Agreement).

(4) The minimum net scale of a merchantable log, which usually will be equivalent to the scale of a sound log of the specified minimum length and diameter.

And, where desirable—

(5) The minimum length and width of material in any log which will be considered merchantable.

(6) A separate set of minimum scale, diameter and length figures to meet special conditions, as with sap-rotted logs cut from dead trees.

Each regional forester will define merchantability specifications for all forest products sold, based on standard commercial practices in the region. Definitions for specified products will be incorporated in timber-sale agreements as needed.

Percentages under No. (3) have been established for each species in each region and will ordinarily be applied uniformly in sawlog sales. These percentages will be not more than 33⅓ percent of the gross scale of logs of the more valuable commercial species and not more than 50 percent of the gross scale of logs of inferior species.

The standard definition of merchantable logs may include a specific statement of the treatment in Forest Service scaling of common defects or alleged defects in the timber of the region. This makes the work of different scalers more uniform and the Forest Service standard more stable. For instance, it is standard practice in most regions to include in sale agreements a statement that firm blue stain in pine logs will not be regarded as a defect. Mill scale studies have shown convincingly that blue stain does not reduce the cut of sound lumber although it does reduce the proportion of upper grades. Further, blue stain sometimes is due to delays by the purchaser in moving logs to the point of scaling and any such reduction in value should not influence the scale.

In the interest of being consistent and fair to timber-sale operators it is desirable to specify in the agreement the minimum scale of a merchantable log. For example, the minimum sized merchantable log might be set at 10 feet in length and 10 inches in diameter at the small end, scaling 30 board feet. The agreement might also specify that a log is merchantable if the net scale is 33⅓ percent of the gross scale—in this case 10 board feet. But if mill scale studies of comparable timber in the locality show that it is unprofitable to handle logs scaling less than 30 board feet, the merchantability standard in the agreement should also include a minimum scale for a merchantable log—in this case 30 board feet. (See No. (4) above.)

In exceptional cases, such as in the sale of sweetgum in bottom-land hardwood types in the South, the heartwood of dead trees may be sound and merchantable and it may be economically feasible to remove logs from such trees, even though the net scale of the sound portion is less than the specified minimum percentage of the gross scale including the rotten sapwood. The agreement should cover such cases specifically.

DESIGNATION OF PLACES FOR SCALING

Unless specified in the sale agreement, the places where timber is to be scaled will be designated by the officer in charge of the sale. Such places should be adapted, as

far as reasonable economy in scaling will permit, to the practical requirements and methods of operation, so as to impose as little additional cost upon the operator as possible. Scaling will not be done, however, in places or under conditions dangerous to life or limb.

FREQUENCY OF SCALING

In small sales the frequency of scaling must be adapted to the reasonable requirements of the purchaser. It is desirable to scale only at intervals within which considerable quantities of timber are logged and assembled, such as 15,000 or 20,000 feet. Any such measures to promote economy must, however, be enforced only as far as it is practicable for the purchaser to comply with them. Sale by tree measurement often is a convenient and economical way to meet difficulties due to lack of log storage space at sawmills or in small operations.

In larger sales the most economical plan of scaling should be considered in advance and provided for in the sale agreement.

REQUIREMENTS OF PURCHASERS

The bunching or skidding of logs is usually unnecessary for efficient or economical scaling. Where necessary, however, for this purpose, purchasers may be required to assemble and hold logs for scaling in the manner prescribed by the forest officer. This should be covered by a specific clause in the sale agreement. On the other hand, methods of scaling should, so far as practicable, be adapted to the operating methods of the purchaser.

If cutting is to be done on Government and private lands simultaneously, the purchaser must be required to keep the logs separate up to the point of scaling, or to put a specified, distinctive mark on all logs from the private land. These requirements are also sometimes necessary to enable the scaler to distinguish between logs from different sale areas, especially if different prices apply to the same species in those sales.

LOG LENGTHS

In scaling national-forest timber, logs over 16 feet in length will be scaled as two or more logs, as far as practi-

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cable in lengths of not less than 12 feet, except in the following instances:

(1) On the national forests in Alaska and west of the summit of the Cascade Mountains in Washington and Oregon the scaling lengths will be determined in accordance with the instructions given below.

(2) On Black Hills National Forest 17- and 18-foot mining timbers will be scaled as one log.

(3) On national forests in regions where it is the practice to manufacture railroad ties 8½ feet long, logs of species cut primarily for ties will be scaled as one log if 17 feet long.

Logs exceeding the maximum scaling length will be divided into two or more logs, all as nearly of the same length as is practicable. If a log must be divided into unequal lengths, the butt log should be the longer. Inexperienced men should determine the diameters of the logs into which the long log will be divided, with the exception of the top log, by measuring the diameter of the long log at both ends and assuming an even taper; but this is not applicable where the log to be divided is a butt log, since taper is not uniform near the butt. Taper tables applicable to the species and region are valuable for training and checking scalers.

For example, a 44-foot log 16 inches in diameter would be scaled as—

One 14-foot log with a diameter of 16 inches.

One 14-foot log with a diameter of 17 inches.

One 16-foot log with a diameter of 19 inches.

Judgment which permits accurate determination of taper without measurement comes only as a result of familiarity with the form of different species in the given region. Especial consideration will always have to be given to the log of abnormal form, since the object is to scale on the basis of the actual taper.

Tables 10 and 11 in the appendix are to be used simply as a guide, the allowance for taper being varied to conform to the actual taper.

On the national forests in Alaska, and west of the summit of the Cascade Mountains in Washington and Oregon, logs up to and including 40 feet in length will be

scaled as one log; lengths from 40 to 80 feet, inclusive, will be scaled as two logs as nearly equal in length as possible in even feet. Greater lengths than 80 feet will be scaled as three logs, the division being made as nearly as possible in even feet and the diameter being increased according to the taper of the log. This departure from the usual method does not apply to sales involving chiefly timber which will be marketed in competition with timber of the same species from sales outside this region, such as sales of ponderosa pine in southwestern Oregon.

When logs are scaled as two or more logs, the scale allowed for the separate lengths will be added and the total recorded as one log.

Table 1, in the appendix, gives the scale of logs cut in odd lengths, such as 17-foot tie logs. The use of odd lengths by purchasers should be encouraged wherever a market for odd-length lumber exists or can be developed.

Scaling 8½-foot Tie Logs.

Tie logs cut 8½ feet long, up to and including 19 inches in diameter, will be scaled as 8-foot logs. When 20 inches or larger in diameter such logs will be scaled as 8 feet long plus one-half the difference between the scale of an 8-foot log and a 9-foot log. If half the difference is a fraction, the next lower whole number will be used.

For example, a 14-inch tie log 8½ feet long will be scaled as an 8-foot log, 60 board feet; a 17-inch tie log will be scaled as an 8-foot log, 90 board feet; a 20-inch tie log will be scaled as $140+\left(\frac{160-140}{2}\right)=140+10=150$ feet; a 25-inch tie log will be scaled as $230+\left(\frac{260-230}{2}\right)=230+15=245=240$ feet.

This rule is adopted in the interest of simplicity, although for logs 30 inches or less in diameter, it results in a theoretical underscale of 5 board feet in logs of seven diameters.

Trimming Allowances.

Each timber-sale agreement should state the trimming allowance. Regional foresters will specify standard allowances for trimming, based upon logging conditions, and

usually varying between large and small timber. Trimming allowances are necessary to compensate for—

(1) Large undercuts on large trees to avoid splitting the butt log.

(2) The impossibility of cutting all logs square-ended.

(3) Injury in log-ends by loading hooks.

(4) Brooming, when logs are driven.

Three inches should be sufficient for trimming allowances in small timber; 6 inches may be reasonable in large logs. It is not the intent to make allowance for stain or seasoning checks in the ends of logs, since delay in scaling may be controlled by the operator.

When long logs are divided into two or more logs for scaling, the prescribed trimming allowance should be permitted for each log into which the long log is divided, since the operator could have presented the logs for scaling in that manner, if he so desired. For example, if the timber-sale agreement specifies a 3-inch trimming allowance, a 30-foot log, scaled as a 16 plus a 14, may be cut 30 feet 6 inches long.

SCALING LOGS

MEASURING, NUMBERING, STAMPING

Measuring Log Lengths.

The scaler will measure the length of every log about which there is any question. In addition, the length of logs in the general run will be measured frequently enough, preferably directly after the sawyers, to make sure that the specified trimming allowance is not exceeded and that there is proper variation of log lengths to obtain the best utilization. Any logs overrunning the trimming allowance will be scaled to the next foot in length, as outlined under "Penalty scale," page 36.

Frequent measuring is of special importance in small sales where a scaler is not always present, since sawyers are more apt to be lax than when the lengths are checked daily by a forest officer.

Measuring Diameters.

All diameters will be measured inside the bark at the small end of the log. Diameters will be rounded off to

the nearest inch above or below the actual diameter. Logs which have a diameter exactly half way between inches will be thrown to the next lower inch.

When the small end of the log is not round, the average diameter will be determined. Several diameters may be measured to obtain a fair average which will be taken as the small-end diameter in applying the log rule.

For example, if two measurements taken are 33 and 38 inches, the average diameter is 35½ inches and the log is scaled as a 35-inch log. The practice of alternately using the higher and lower diameters in logs with tops of irregular diameters will not be followed.

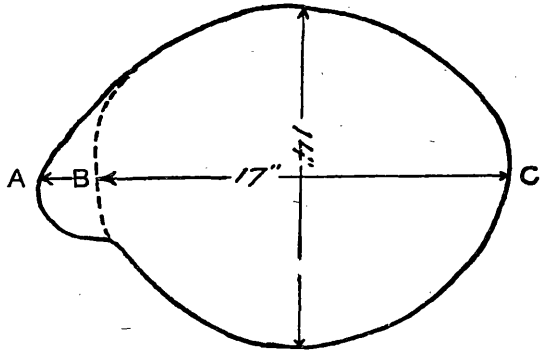

FIGURE 1.—Method of determining average diameter of a log.

In obtaining the average diameters of logs, care should be taken to ignore slight abnormal swellings. For instance, in figure 1, *BC* rather than *AC* would be taken in determining the long diameter. The average diameter would be $\frac{(14+17)}{2}=15\frac{1}{2}$, or dropping to the next lower inch, 15 inches.

Numbering Logs.

Every log, whether merchantable, or cull, must be numbered with crayon at the time it is scaled, except under conditions which in the opinion of the supervisor will permit no subsequent use of the numbers, in which

case a specific waiver of the requirement will be made
him. It is frequently convenient to number all logs i
rollway, and then scale and stamp them, thus mak
sure of an entry in the scale record for each log in
rollway. The number should be placed on the small
of the log unless this is clearly impracticable.

The scale of each merchantable log will be ente
opposite the log number in the scale book in the colu
provided for that species.

The gross scale of each cull log presented for scal
will be entered opposite the log number in the scale bc
either in a circle, or in the column provided for def
and the word "cull" or the letter "C" entered in
species column. Cull logs scaled and entered in the s
books will be counted as pieces and reported as log
their particular species. If cull logs are sold for some o
product, such as for cordwood in the Black Hills, t
will be entered as a separate class of material and no bo
foot scale will be recorded.

Merchantable logs left in the woods and penalty sc
should be numbered so that they can be identified rea
in case of complaint by the purchaser. Unless requ
by the regional forester in ascertaining the cull percen
on sale areas or for some other reason, the numbering
recording of cull logs not presented for scaling will nc
necessary

Numbering, as a feature of Forest Service scalin
essential for the following reasons:

(1) It is a check on the total number of pieces sc
and prevents the missing of logs.

(2) It fixes the responsibility of the scaler by indivi
logs. It is thus a safeguard against lax scaling.

(3) It permits an exact check on the scale at any
This is desirable even when logs are manufactured ir
diately, and enables the supervisor, check scaler, o
spector to make a check if only of a half dozen
whenever the sale is visited.

(4) It affords a definite basis for settlement of
plaints and is a protection to the purchaser.

Scale-Book Letters.

In sales which require the use of more than one
book, the books should be lettered serially with the l

of the alphabet, in the order in which they are used. In order to avoid confusion in recording the scale of logs in several small sales to the same purchaser in which logs are brought to adjoining landings, a different series of letters may be used for each sale in addition to the differences in dates of the sales.

In large sales, serial numbers need not be continued throughout the contract, since numbering is intended only for the identification of individual logs. It is usually sufficient to number logs consecutively to the end of each scale book, beginning the next book with No. 1. As a rule there should be an unbroken series of scale-book letters covering the cut of each logging season.

Serial letters need not be placed on logs except when so ordered by the supervisor. The only purpose in marking these letters on the logs is to avoid confusion in check scaling. It should be unnecessary, except in cases where two or more scalers are working concurrently on a large sale on which the logs scaled by the different men are liable to be mixed together. When serial letters are placed on the logs, they may be put on the small end with the number.

Stamping Logs.

Each log scaled will be stamped "U S" on at least one end. This will always be the end opposite the number (the large end, since logs are usually numbered on the small end, p. 16) unless this is clearly impracticable. This requirement is made to insure that the scaler sees both ends of each log and does not miss any logs. It also aids the check scaler in locating scaled logs. The stamp signifies an official scale, subsequent to which title to the timber, previously paid for, passes to the purchaser. The removal or use of unstamped timber is a breach of the agreement.

Logs so defective as to be unmerchantable under the terms of the sale agreement will be plainly marked in addition to the "U S" stamp, in one of the following ways as prescribed by the regional forester: (1) With a circle around the stamp thus, (U S); (2) with the word "Cull" and the initial of the scaler.

It is essential that cull logs be distinguished plainly from merchantable logs in the manner prescribed in order to identify the culling as done by a forest officer. The distinguishing mark should be made as permanent as possible. This is necessary to show the disposition made of the log in the event of another officer taking charge of the sale, of checking the area over for penalty scale, or of subsequent inspections of the cutting.

Some regions have special clauses in their sale contracts concerning material, unmerchantable because of size, which the purchaser may wish to remove at his option. If a separate price is provided for such logs, they will be recorded in the scale book under appropriate column heads. Otherwise they will be scaled without distinction from logs of merchantable size of the same species.

It is essential to distinguish sharply between cull logs and logs which meet the percentage of sound contents and minimum scale specified in the agreement. All logs which do not meet the specifications of the agreement will be culled, except as provided for in the preceding paragraph.

Free use of all material unmerchantable under the terms of the sale agreement should always be permitted for sale improvements. Its removal and use for other purposes is discretionary with the regional forester. Logs consisting in part of merchantable and in part of unmerchantable material will be charged for at the contract price for the merchantable contents if the merchantable portion would be subject to penalty scale. (See penalty scale on p. 36, the merchantability clause, Form 202, and Utilization Requirements in the National Forest Manual.)

Check on Total Number of Logs.

Unless the logs have been numbered or marked on both sides of the pile or skidway, a practice frequently followed where two men scale together, the logs in each pile or skidway will be counted after scaling, and the total checked with the number of entries in the scale book.

DEDUCTIONS FOR DEFECTS

Classification of Defects.

The effect of rot and other defects upon logs of different species and in different regions varies so greatly that no

rules for making deductions can be applied inflexibly. Scalers constantly must exercise good judgment, based upon knowledge of local timber, obtained by watching defective logs opened up under the saw.

Defects are classified as follows (fig. 3):

(1) Interior defects, which cause waste in the interior of logs.

(2) Side defects, which cause waste on the outside of logs.

(3) Defects from curve or sweep.

(4) Defects from crotches.

(5) Defects from an excessive number of knots in top logs. (Subject to regional definition, see p. 6.)

The Right Cylinder.

Figure 2 illustrates the right cylinder of a log. Defect which occurs outside the right cylinder will not be taken into consideration in making deductions. Where the standard rule is used in making deductions for defects which extend to the margin of the log it must be remembered that only the defect which falls inside the slabbed surface as well as inside the right cylinder will be considered. The reason for this is that while the Scribner log rule makes allowances for the slab, the method used in applying the standard rule for deducting defects does not. It will be Forest Service practice where the question of slab is involved to allow 1 inch on the radius inside the right cylinder for slab.

FIGURE 2.—The right cylinder of a log.

Standard Rule.

The most accurate method of mathematically reducing the scale for interior defects showing in one or both ends of the log is to treat the defects as sawed out in squares or rectangles. The Scribner decimal C rule is based upon diagrams of 1-inch boards with ¼-inch kerf. Twenty percent of any square or rectangle inside the slabbed

surfaces of the log is, therefore, deducted for kerf in the rule. This deduction is carried in scaling sound timber, and hence should not be included in allowances for defect.

The scaler first measures the end dimensions of the square or rectangle which will be wasted in manufacture and determines its length. A slight allowance in excess of the dimensions bounding the actual defect is made to cover the loss in sound material surrounding the defect which must be discarded with the defective material. This incidental loss, which will ordinarily be taken to be 1 inch, is added to the actual diameter of the defect to give its total dimensions. From the computed contents of the defective material in board feet, 20 percent is deducted as the log rule's allowance for saw kerf, and the remainder raised or lowered to the nearest 10. The gross scale of the log is then reduced by this amount.

The substance of this method is to deduct 80 percent of the board-foot contents of a piece of timber having the same dimensions as the defect. The entire process may be stated algebraically as follows: If W'' and H'' represent the end dimensions of the defect in inches, L' the length of the defect in feet, and X its contents in board feet after 20 percent is deducted for kerf, X, or the net reduction to be made in the scale, may be obtained as follows:

$$X=\frac{W''\times H''\times L'}{12}\times\frac{80}{100}=\frac{W''\times H''\times L'}{15}$$

X must then be raised or lowered to the nearest 10.

Table 3, appendix, lists deductions for defects which may be cut out in rectangles, varying from $2''\times3''$ to $29''\times30''$ and from $4'$ to $40'$ in length.

Table 4 gives similar deductions for squared defects from $2''\times2''$ to $30''\times30''$ and from $4'$ to $40'$ in length.

Dimension of Defects.

Ordinarily when defect shows in both ends of a 16-foot or shorter log the allowance will be computed from the width and height of the larger visible defect, whether this shows on the large or small end of the log. On a log

longer than 16 feet, the allowance will be based on the average of the widths and heights of the defect on both ends of the log. The regional forester may authorize the use of average dimensions in logs 16 feet or shorter where the agreement specifies that lumber shorter than 8 feet is merchantable.

Where the defect shows on only one end of a log, the scaler will determine the length of the defect by a close inspection of the log for surface indications. Interior rots, with the exception of butt rots, can usually be detected by punks, punk scars, or rotten knots. In a log which has defect in one end, but which has no surface indications on the sides to aid in determining the distance that the defect extends into the log, the scaler will be guided by local instructions issued by the region in which he is working. Unless local studies have definitely established the action of the various fungi with reference to their surface indications, it will be necessary for the scaler to use the diameter of the visible defect on the end of the log in determining the necessary deductions.

Standard methods of determining width and height (to each of which is added 1 inch) and length to be used in applying the standard rule for deductions for defect in logs of various lengths are—

(1) Defect shows on both ends of a 16-foot or shorter log. W'' and H'': Measure on whichever end of log shows greater defect. L': Length of log.

(2) Defect shows on both ends of a log longer than 16 feet, scaled as one log. W'' and H'': Average the measurements from both ends of log. L': Length of log.

(3) Defect shows on both ends of a log longer than 16 feet, divided into two or more logs for scaling. W'' and H'': Follow (1) for each log into which it is divided for scaling. L': Follow (1) for each log into which it is divided for scaling. Estimate dimensions of defect at interior points by use of taper table, page 98, appendix.

(4) Defect shows on only one end of log. W'' and H'': Obvious. L': Use estimated length of defect, unless this leaves a portion of the log shorter than the minimum board, in which case, use length of log.

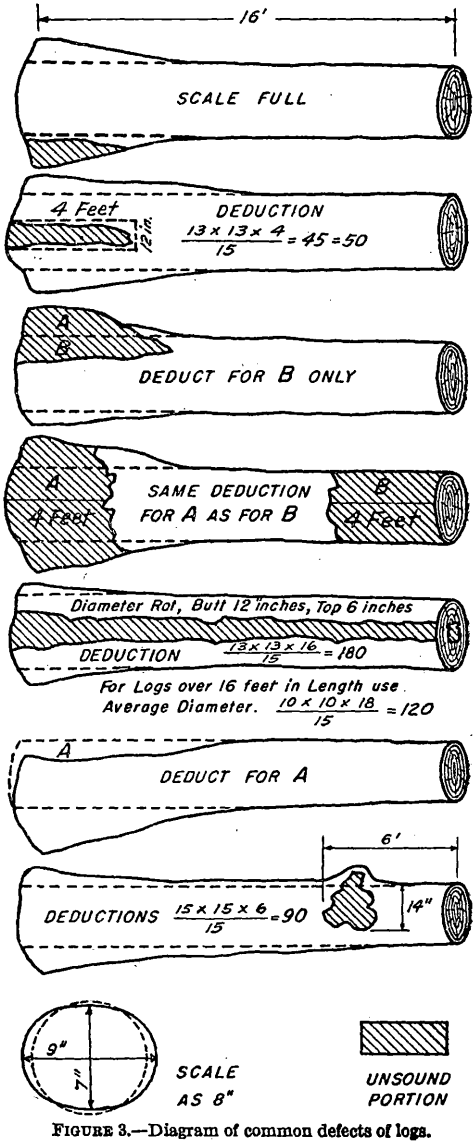

FIGURE 3.—Diagram of common defects of logs.

Center or Circular Rot.

Figure 4, illustrates a 16-foot log containing center or circular rot extending the entire length of the log. In determining the deduction on 16-foot logs the usual practice of the Forest Service is to take the large end of the defect. By the standard rule, 1 inch is allowed for waste in sound material which will be wasted in sawing out this defect, so that the average diameter of the defect illustrated in figure 4 will be considered as 11 inches+1 inch= 12 inches. $\frac{12\times12\times16}{15}=154$, or, rounded off to the nearest 10=150 board feet. The gross scale of a 20-inch log inside bark is 280 board feet; so the net scale is 280−150=130 board feet. Where the sale agreement fixes the merchantability of logs at not less than 33⅓ percent of the gross scale

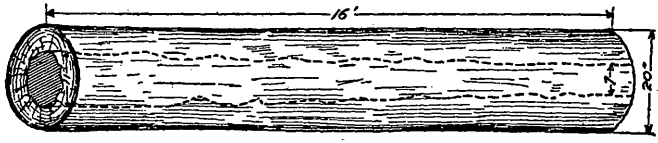

FIGURE 4.—Deduction for defect caused by center or circular rot.

this log would be merchantable. If the sale agreement fixed 50 percent of the gross scale as the minimum, the log would be a cull, since 50 percent of the gross scale would be 140 board feet.

If the regional standard, and the sale agreement, specify a minimum board shorter than 8 feet, the average diameter of the defect would be used, in making the deduction in 16-foot or shorter logs. In this case the deduction would be $\frac{11+7}{2}=9$ inches. Allowing 1 inch margin, 9+1=10, or $\frac{10\times10\times16}{15}=107=110$ board feet, and 280−110=170, the net scale.

Had this log been longer than 16 feet the average diameter as found by taking a measurement of the defect at both ends of the log would have been taken. For instance, an 18-foot log would be treated as follows: $\frac{10\times10\times18}{15}=120$

board feet. An 18-foot log 20 inches in diameter scales. 310 board feet, so the net scale is 310—120=190. In regions where logs longer than 16 feet are scaled as two or more logs, the amount of deduction to be made for this 18-foot log will be found by determining the defect for each individual log into which the log will be divided. The total net scale for the two logs will be recorded in the scale book as the scale of an 18-foot log; viz, the long log will be divided into a 10-foot log and an 8-foot log. The big end of the defect at the end of the 10-foot log will be 11 inches as given, and the diameter of the big end of the defect in the 8 foot log will be 8 inches (7+1 for taper). Since the diameter of the small end of the 18-foot log (and also the 8-foot log) is 20 inches, the diameter of the small end of the 10-foot log would be 21 inches. (Table 10, appendix.) The deduction for the 10-foot log would be $11+1=12$, $\frac{12\times12\times10}{15}=96$ board feet=100 board feet

The deduction for the 8-foot log would be $\frac{9\times9\times8}{15}=43$ board feet=40 board feet. The scale of a 10-foot log 21 inches in diameter is 190 board feet. The scale of an 8-foot log 20 inches in diameter is 140 board feet. Then 190+140=330 board feet and 330—(100+40)=190 board feet, the net scale.

Where logs are bucked in the woods in long lengths merely for convenience in logging and are cut into shorter lengths at the mill before sawing, the scaler will consider the logs into which the long log is divided for scaling individual logs insofar as cull logs are concerned. For instance, if one of the 16-foot logs which goes to make up a 32-foot stick is a cull log under the merchantability clause of the sale agreement, the net scale of the other 16-foot log only will be considered in recording the scale of the 32-foot log. In other words, any net scale which it may be possible to obtain in the cull log will not be taken by the Forest Service.

Where the defect shows upon one end of the log only, the diameter of the visible end of the defect always will be taken and the scaler will estimate the distance the defect extends into the log. If the defect in the log in

question (fig. 4) extended into the log 8 feet, the deduction would be $\frac{12\times12\times8}{15}=77=80$ board feet. Should the defect extend into the log 10 feet in a region where 6-foot lumber is not merchantable, the defect would be taken as having a length equal to that of the log. The scaler will be guided in estimating the length of defect by experience gained in seeing logs opened up at the mill, by surface indications, and by definite instructions issued by the region in which he is working.

Ground or Stump Rot.

Ground or stump rot in butt logs seldom extends far into the log and usually tapers to a point.

Figure 5 illustrates a 16-foot log scaling 210 board feet gross, with a stump rot in the butt having an average diameter of 14 inches. The deduction should be made by cutting off 4 feet in the length of the log, giving the log the scale of a 12-foot log, 18 inches in diameter; viz, a 16-foot log 18 inches in diameter scales 210 board feet; a 12-foot log 18 inches in diameter scales 160 board feet. Amount of deduction is 50 board feet.

In this case the standard rule would give a deduction figure greater than the actual scale of a 4-foot section of the log; viz, $14+1=15$, $\frac{15\times15\times4}{15}=60$ board feet. This is due to the fact that when the diameter of the defect is so large as to approach the diameter of the right cylinder the volume of the squared defect is greater than the board-foot volume of a right cylinder having the same diameter. If the defect in this case had been, say, 7 inches, by the standard rule the deduction would have been $7+1=8$, $\frac{8\times8\times4}{15}=17=20$ board feet. Therefore, in cases where the deduction obtained by the standard rule is greater than the deduction obtained by reducing the length of the log (for the same length of defect) the latter method will be used. It should be clearly understood that no fixed rule can be established as to the distance stump rot will extend into the log. An extreme case has been taken in the

illustration given here in order to bring out a condition where the standard rule cannot be used. In many cases a rot occupying as large a portion of the end of a butt log as given in the illustration would extend into the log a greater distance than 4 feet.

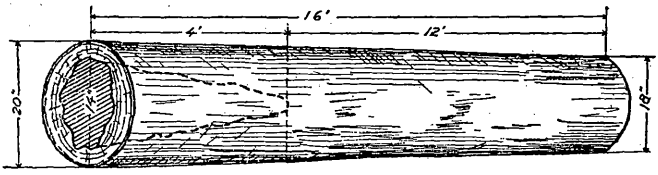

FIGURE 5.—Deduction for defect caused by stump rot.

Sap Rot.

In certain species with pronounced differences between sapwood and heartwood, the sapwood may have started to break down or may be in more advanced stages of decay, while the heartwood is unaffected, and fully as merchantable as if the sapwood were sound. This may be particularly true of logs cut from dead trees. In such cases, the net scale of the log is obtained by scaling the sound heart. For example, a 16-foot log, 28 inches in diameter at the small end has a gross scale of 580 board feet. If a 4-inch band of sapwood is rotten, the net scale of the log will be the gross scale of a 16-foot 20-inch log, 280 board feet. The allowance for defect is 300 feet. This log would be merchantable if the definition of merchantability were that a log must scale at least 33⅓ percent of the gross scale, but it would not be merchantable if the requirement were 50 percent of the gross scale.

In some sales of dead timber with the sapwood decayed, the agreements state that logs will be scaled inside the sapwood, and in such cases the sapwood, like the bark, is disregarded in scaling. "Gross scale," in such a case, refers to the heartwood only.

Other Fungous Rots.

It is difficult to prescribe general methods for making deductions for defects caused by the various species of fungi, because of the different action of a particular fungus in different species of trees and under different soil and

climatic conditions. A single punk of the fungus *Trametes pini* on a log of western white pine in north Idaho usually indicates rot extending 2 feet toward the top of the log and 4 feet toward the butt, while with the same fungus in Douglas fir in the Pacific coast region the rot will extend from a single point of infection as much as 20 feet. Each regional forester should, therefore, issue such special instructions as he may see fit covering the practice to be followed in making deductions for those rots which do not come under the classification "center or circular rot." Two very good discussions on the behavior of the different rots and the methods to be used in making deductions for them in western conifers will be found in Clyde E. Knouf's bulletin "Trade Course in Log Scaling for Idaho Woods," published by the Idaho Board of Vocational Education, and E. J. Karr's pamphlet entitled "Log Scaling in the Douglas Fir Region," which was also published in the April 1920 issue of the Timberman.

Cat Face or Fire Scar.

Figures 6 and 7 illustrate the method of deducting for defect caused by a fire scar or other defect of similar form. The scar extends 7 feet from the large end of a 16-foot log which measures 24 inches average diameter on the small end. After allowing for taper and slab, the deductible length of the defect is 6 feet; 7 inches of the right cylinder, inside slab, is lost on the large end of the log, but the loss tapers to 0 at the upper end, 6 feet distant. The average depth of the defect is $\frac{(7+1)+(0+1)}{2}=4.5=5$ inches. 17 inches is the average width of the defective portion, inside slab. The standard rule is then applied as follows: $\frac{5\times17\times6}{15}=34=30$ board feet deduction. The gross scale of a 24-inch log, 16 feet long is 400 board feet. The net scale of the log shown in figure 6 is, therefore, 400−30, or 370 board feet. It will be noted that this solution of the problem allows for the utilization of some boards 10, 12, and 14 feet long, otherwise a somewhat larger deduction would be made.

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A rule-of-thumb solution might be to estimate that one-third of the cross section of the right cylinder is affected. A log 6 feet long with a top diameter of 24 inches scales 150 feet; one-third of 150 feet is 50 feet, the amount of deduction. A 16-foot log 24 inches in diameter scales

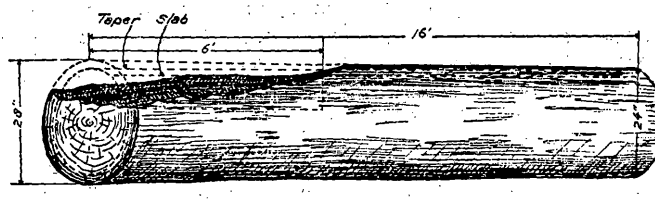

FIGURE 6.—Deduction for defect caused by fire scar.

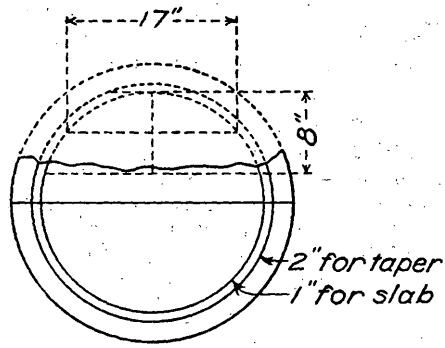

FIGURE 7.—Application of standard rule for determining defect caused by fire scar.

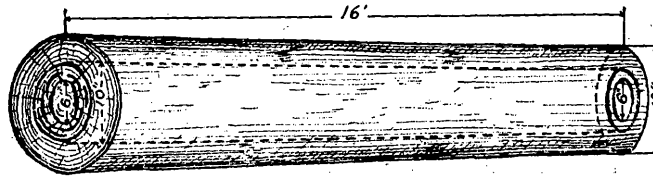

FIGURE 8.—Deduction for defect caused by center shake.

400 feet, so the net scale is 400—50=350. This method is inaccurate and should not be used in this case, since it results in a net scale which is lower than that obtained by using the standard rule.

Shake or Pitch Ring.

Figure 8 illustrates an 18-inch, 16-foot log with center shake 10 inches in diameter extending all the way through the log. By the standard rule the deduction would be $10+1=11$, $\frac{11\times11\times16}{15}=129=130$ board feet. A 16-foot log, 18 inches in diameter, scales 210 board feet and $210-130=80$ board feet. This would be the net scale if all of the material inside the outer ring of defect were defective. In the case in question, as illustrated in figure 8, there is a sound 6-inch core in the center of the defect which scales 20, so that the net deduction will be $130-20$, or 110 feet. The net scale will be $210-110=100$ board feet.

The illustration assumes a case where the shake extends the entire length of the log. If it extends but part way into the log, the deduction will be made only for the estimated length of defect, subject to the same consideration of the usability of short lengths, as in the case of rot.

Heart Check, Frost Crack, or Split.

Figure 9 illustrates a 16-foot log with a heart check extending part way across the butt end. The length of

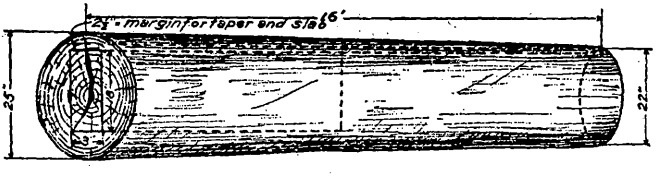

FIGURE 9.—Deduction for defect caused by heart check.

the check is 18 inches inside the right cylinder and slab, and it is estimated it will require an allowance of 3 inches in width to eliminate the waste in sawing, and that the defect extends into the log 8 feet. Deductions for defects of this nature should be made by the standard rule. The amount of the deduction is $\frac{3\times18\times8}{15}=29=30$ board feet.

It will be noticed that although the defect extends to the outer edge of the log deduction is made only for that portion which is inside the slab and the right cylinder.

Heart check is often twisted, and when it passes through the log and comes out at a different angle the deduction will necessarily have to be increased to allow for the loss of lumber due to short lengths.

No deduction will be made for checks due to unnecessary delays in presenting logs for scaling.

Lightning Defect.

The log shown in figure 10 has a severe lighting scar extending along its entire length. The scar spirals one-fourth of the way around the log. It extends four inches into the log; that is, 3 inches inside the right cylinder and slab, and is 4 inches wide.

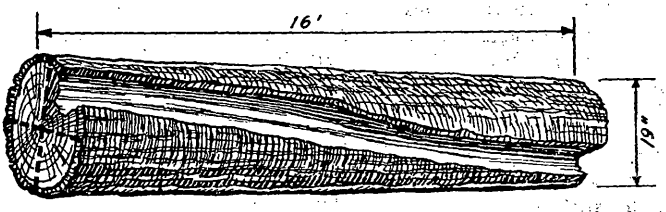

FIGURE 10.—Deduction for defect caused by lightning.

If the scar were straight instead of spiraling, the standard rule could be applied. Adding 1 inch to each dimension of the defect, the computation would be

$$\frac{4\times5\times16}{15}=21=20 \text{ board feet deduction.}$$

Since the scar spirals, however, one-fourth of the surface of the log will be affected to a depth of 3 inches inside the slab. (Note, if there is considerable taper in the log, the average depth may be less than 3 inches.) The log is 19 inches in diameter, therefore, approximately 60 inches in circumference. Using one-fourth of the circumference and applying the standard rule results in

$$\frac{4\times15\times16}{15}=60 \text{ board feet deduction.}$$ But, an estimated

one-half of the part of the log affected by the defect is sound and will produce boards 8 feet long or longer. The allowance for defect is, therefore, $\frac{60}{2}$ = or 30 board feet.

Crook or Sweep.

Crook and sweep in logs usually can be minimized, and frequently practically eliminated, by expert bucking. This is particularly true where short logs commonly are cut. Scalers must be on the alert to detect and correct continued poor bucking causing unnecessary loss from crook or sweep. If an operator persists in such practices, after adequate warning, the supervisor may direct that no allowance be made for crook or sweep until bucking is improved.

If crook or sweep occurs in long logs which are scaled as two or more logs, allowance will be made only for so much of the defect as cannot be eliminated when dividing the log into shorter sections for scaling.

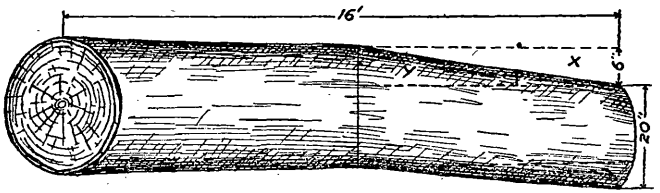

FIGURE 11.—Deduction for crook or sweep.

Figure 11 shows a 16-foot log 20 inches in diameter at the top, scaling 280 board feet. Half of the log is not affected by the crook; one-third of the other half of the log will not produce the full scale for this portion of the log since the section marked *X* is lost. Part of section *Y* will produce 10-, 12-, and 14-foot lumber. It is estimated that two-thirds of the sections *X* and *Y* are lost. Sections *X* and *Y* are figured to be one-third of the scale of the 8-foot section (140 feet) or 46 feet, and two-thirds of this, or 30 board feet, is the deduction. The net scale would then be 140+110=250 feet.

It is customary practice to make deductions for crook by merely reducing the length of the log. In this case the

log would probably have been scaled as a 14-foot log, 20 inches in diameter, which would give a net scale of 240 feet, or 10 feet less than by the method used above.

Another method of deducting for sweep is illustrated in figure 12. In this case the sweep extends the whole length of the log and will evidently cause some waste when the log is sawed. If the sweep causes a deviation not exceeding the taper of the log, no loss occurs and no deduction will be made.

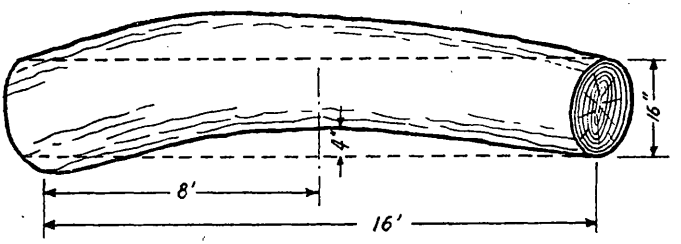

FIGURE 12.—Method of deducting for sweep.

A rule of thumb given by Chapman is "add ⅓ to the percent of sweep as expressed in terms of the diameter of the log to obtain percent of cull."

In the log shown in figure 12, this rule would be applied:

$\frac{4}{3}\times\frac{4}{16}=\frac{16}{48}=\frac{1}{3}=33\frac{1}{3}$ percent. A 16-inch log, 16 feet long, scales 160 feet; 33⅓ percent of 160=53=50 board feet. The net scale of this log is therefore 160−50=110 board feet.

Wind or Sun Check.

Figure 13 illustrates a log containing wind checks its entire length. The checks on the ends of the log reach in 6 inches toward the center. The common method of making deduction for this defect is to scale the diameter of a log which results by dropping in from the edge of the log one-half the length of the checks. In the illustration the small end diameter of the log is 24 inches. By scaling halfway in on the checks, 3 inches of material is excluded around the outside of the log and the log is scaled as having a diameter of 18 inches. A 24-inch log

scales 400 board feet. An 18-inch log scales 210 board feet—the net scale. Deduction is 400—210=190 board feet. The reason for not scaling inside the checks is that ordinarily the waste due to the checks is not so great in the interior of the log as it is on the ends.

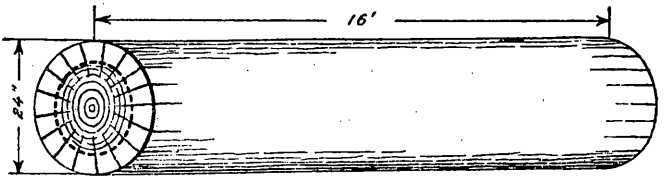

FIGURE 13.—Deduction for defect caused by wind checks.

Occasionally only a portion of the log is checked. In such cases the log is divided into sectors (the method is similar to that for lightning defect), all of the waste is thrown into one sector, and deduction made accordingly.

Stains.

Blue stain in itself is not a wood-destroying fungus, but it offers an entrance to other fungi which do break down the structure of the sapwood. Defective sapwood will be deducted for by scaling to the average diameter inside the sap. No deduction will be made for sound blue stain.

Red stain may be an early stage of red rot and treatment in scaling should be governed by the principle that deduction for defect is made only where the defect causes a reduction in the sound material contained in the log.

Mineral stain and firm blackheart in hardwoods ordinarily do not involve actual breakdown of the wood fibers, but may ruin a log for manufacture of specific products, such as turnery stock. Exceptions to the general rule may be made and such stains classed as defects when so authorized by the regional forester. It is preferable, however, to sell timber of this character on a log-grade basis, considering sound defects in defining log grades, thus making it possible to adhere to established standards of scaling, within log grades.

Regional foresters will issue local instructions covering the application of the principles of this handbook in the treatment of logs with firm stains of all characters.

Crotch.

Figure 14 shows a 16-foot log with a crotch at the top end. The dimensions of the top end are 15 and 26 inches, respectively, but it is obvious that an average of these two measurements would not give a true scaling diameter. The proper place to obtain the diameter for scaling this log is just below the swelling. However, since this diameter can be obtained accurately only by use of calipers or a diameter tape it is customary for the scaler to measure the butt diameter and make an allowance for taper in determining the top diameter to be used. In this case the diameter obtained is 20 inches and the full scale of the log is 280 board feet.

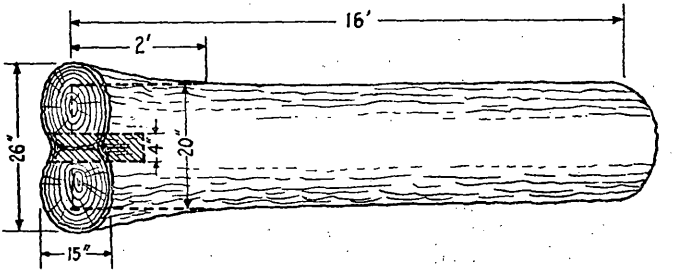

FIGURE 14.—Method of scaling a crotched log.

There is little usable material in the 2-foot crotch end, and good bucking would have eliminated the crotch. The log should be scaled as a 14-foot, 20-inch sound log, 240 board feet.

In case the crotch is cut off so close to the point of departure from the main stem that the surface of the end of the log is unbroken by bark or split no deduction will be made.

Worm Holes.

Worm holes may be of two general classes, (1) "pin worm" holes, which in certain species such as chestnut and oak may cause degrade ("sound wormy" is a recognized lumber grade for these species) but no actual loss of sound material, and (2) holes caused by wood borers

which make the affected lumber unusable. Obviously, no deduction should be made for class (1) worm holes in species and localities where such lumber is salable. Defect caused by class (2) worm holes is more serious.

Figure 15 represents a 16-foot log, 24 inches in diameter, scaling 400 board feet, having worm-holes defect brought in by fire damage, occupying 9 inches of the cross section of the log from the butt end to within 4 feet of the top. Since the 4-foot lumber on the end of the defect is not merchantable, deduction must be made for the entire length of the log. Deductions for this type of defect should be made similarly to those discussed under catface or fire scar.

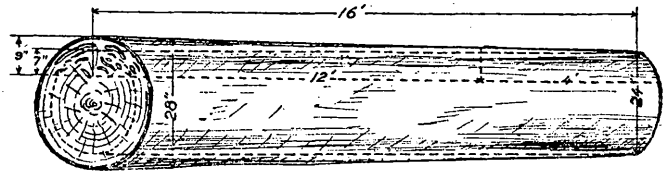

FIGURE 15.—Deduction for defect caused by worm holes.

In the case illustrated in figure 15, the diameter of the right cylinder is 24 inches, the worm holes are confined to an area on the end of the log measuring 6 inches by an average of 15 inches within the right cylinder and slab. The standard rule may be applied, after adding 1 inch to each dimension. $\frac{7\times16\times16}{15}=119=120$ board feet deduction. The gross scale of a 16 foot log 24 inches in diameter is 400 board feet. Net scale is, therefore, $400-120=280$ board feet.

DETERMINING THE MECHANTABILITY OF LOGS

The percentage of the total scale of a log which determines its merchantability should always be reckoned from the full scale, including unsound sap, checks, curve, and any other defects present, unless otherwise stated in the agreement for sap.

SCALING GREEN AND DEAD TIMBER

In sales which include green and dead timber at separate stumpage prices the scaler should not attempt to trace logs from the tree to establish their character, but may classify them on the appearance of the log at the point of scaling.

DAMAGE AND WASTE SCALE

The damage and waste-scale clause of Form 202 provides for liquidated damages to cover losses to the United States which result from leaving material in the woods or cutting contrary to the terms of the sale agreement.

Enforcement of the damage and waste-scale clause is mandatory except in accidental or exceptional cases involving small amounts of timber, where it may be waived by the officer in charge. Whenever waste subject to the damage and waste-scale clause occurs, the officer in charge will notify the purchaser and call his attention to the utilization required by the sale agreement. In order to avoid later controversy, notification should be given in writing. If further waste occurs, or if material previously left in the woods, the utilization of which is practicable, is not removed, a damage and waste scale should be made of all such material and reported to the supervisor.

Some of the most common examples of poor utilization which call for damage and waste scale are—

(1) A log unmerchantable under the terms of the sale agreement due to defect, which would have been merchantable if the length of the log had been reduced by cutting off the end containing the major portion of the defect.

(2) A log unmerchantable due to its top diameter being slightly less than the utilization requirement of the sale agreement, which would have been merchantable had the log been cut shorter.

(3) Merchantable material on the end of a cull log, which should have been utilized by increasing the length of the adjacent log.

(4) Sound material left in cutting out breaks, sharp crooks, etc., or material left in the top of a tree with a

greater diameter than the minimum required by the sale agreement, which could have been utilized by increasing the length of the adjacent log.

(5) Excessive long-butting, sometimes carried to the extreme of attempting to eliminate all stump rot or other butt defects. Long-butting should not exceed the material which would be unmerchantable considered by itself and without regard for the minimum merchantable length provision of the agreement. Butting off more wastes the part of the tree from which the best grades of lumber ordinarily are obtained. The damage and waste scale will be of lengths of 1 foot or more which, aside from the minimum length provision, would be merchantable.

Damage and waste material should be scaled as promptly as practicable, and in any case immediately after the completion of operations upon a logging unit.

Material subject to this requirement (damage and waste-scale clause, Form 202) will be scaled, stamped, and numbered as in the regular scale, and recorded as indicated on page 58.

Scaling Lengths.

Under the scaling-length clause of Form 202, logs overrunning the specified allowance for trimming will be scaled not to exceed the next foot in length. If a scaler finds frequent violations of the trimming allowance, he should notify the purchaser, preferably in writing. If further violations occur, he should measure all logs and scale as 1 foot longer any pieces overrunning the trimming allowance. Damage and waste scaling of this character will be noted plainly in the scale book against the number of the log to avoid possible controversy.

SETTLEMENT OF COMPLAINTS

Complaints should be settled by a check scale. If the results of the first check are questioned upon apparently good grounds, a second check should be made by another scaler. It is the policy of the Forest Service to ascertain the justice of complaints by a rescale conducted by a more competent and experienced man, not by lumber tallies or mill checks. Complaints will be settled by mill checks

only in extreme and exceptional cases where required by the defective character of the logs or other special local conditions.

If a check scale indicates that a serious injustice has been done the purchaser by errors in scaling, the scale may be adjusted by rescaling all the logs, if available, or, if this cannot be done, by the regional forester on the basis of the errors shown by the check scale. Decision whether to make an adjustment will be based not only on the percentage of error as shown by the check scale of a necessarily limited number of logs, but also on the character of errors which the check scaler finds have been made. For example, a consistent mistake in determining species sold at different rates may require an adjustment even if the volume of all material check-scaled is within a small percentage of the volume as originally scaled.

CHECK SCALING

The chief purpose of check scaling is to make and keep the current scale in all classes of sales accurate by indicating sources of error, and particularly by instructing scalers on the ground. Systematic check scaling is therefore a necessary part of timber-sales administration.

A check scale should be made at least once a year on each sale on which the annual cut is 1,000,000 or more feet. Wherever, as in project sales, one or more scalers are required in addition to the man in charge, each scaler should be check-scaled once a month, if possible, by the man in charge or other qualified forest officer. Smaller sales should be checked as frequently as may be necessary to train properly the local officers in charge of them. Checking the scale of rangers who have but little sales work is of special importance, since the largest percentages of error may occur in such cases.

Check scaling, as far as practicable, should be done under conditions similar to those under which the original scale was made. As many logs as practicable should be scaled by the check scaler after they have been scaled by the local officer and without knowledge of his figures. Ordinarily 200 to 400 logs will constitute a satisfactory check. The log numbers and scale given in the original

scale record for the particular logs on which a check scale has been made will be recorded in the check scaler's book (Form 122). The original scale will be compared with the scale of the check scaler and the results summarized as indicated on the form. In regional forester's and Chief's sales, and in cases of complaint, the record will be prepared in triplicate, one copy for the regional forester, one for the supervisor, and one for the scaler. In all other sales, copies of the record will be furnished the supervisor and the scaler only.

Ordinarily a check scale on sound logs should come within 1 percent of the original scale; on logs up to 10-percent defective, within 2 percent; on logs 11- to 20-percent defective, within 3 percent; and on logs over 20-percent defective, within 5 percent. These percentages are intended simply as approximate standards of satisfactory scaling for the guidance of forest officers, not as a basis for changing the original scale. Regional foresters should supplement these guides, when necessary, with local standards. For example, if a high percentage of all logs are defective, the ordinary check scale may not embrace enough sound logs to provide a usable check on the accuracy of the scaler in handling this class of log, and the local standard appropriately should apply to all logs, rather than to sound and defective logs separately.

The original scale will be modified only when found to have been fundamentally wrong in method or in treatment of important defects and when it is clear that serious injustice has been done to the purchaser. Changes will be made only with the approval of the regional forester.

MILL-SCALE STUDIES

Mill-scale studies are made to obtain accurate data on lumber yields by grades and overrun, for use in stumpage appraisals. Wherever practicable, especially in the case of defective timber, logs should be followed through the mill by the scaler to see how they "open up," in order to train his judgment in allowing for defects and other features of scaling. But it is the policy of the Forest Service to use check scaling in investigating complaints and not to make mill-scale studies at a purchaser's mill for this purpose.

SCALING FROM THE STUMP

USE OF STUMP SCALES

A stump scale is obviously less accurate than a scale of logs, even when measurements are made most carefully. Stump scales should never be used, therefore, when log scales are practicable. This method will be employed only in timber trespasses and other cases where the logs have been removed and a log scale is impossible.

IN TIMBER TRESPASS

The total log lengths cut from each tree should be measured in making a stump scale of a timber trespass. Often the indentation in the ground, where the butt struck in felling, can be located. From that point, which may be several feet from the stump, the total log length should be measured to the top, the direction of which can usually be determined by the undercut on the stump. The total length should be divided into logs in accordance with taper tables 10 and 11, appendix, and the instructions on page 12. The diameter of each log should be ascertained from the table or estimated from the total length and the top and stump diameters. The scale of each log may then be obtained from a scale stick or table 1, appendix. Merchantable timber left in tops, in high stumps, and in unused logs should be scaled and entered separately. After each tree has been scaled, the top of the stump and the butt of the top should be stamped "U S" and each stump and corresponding top numbered for future identification. Deductions from the scale should be made for cull in accordance with the best data available for the class of timber concerned.

Where the tops cannot be identified or have been moved or destroyed by fire, the scale may be obtained from the best volume table available for the locality and species by reducing the diameter at the top of the stump to diameter breast high. Volume tables may be used in lieu of stump scales, particularly when heights can be checked on trees bordering the cutting, if the results of this method are believed to be more accurate.

Forest officers should use extreme care in scaling trespass timber, especially by a stump scale, and should keep com-

plete notes of the method used. If the case is brought into court, the scale and details of the methods used must be introduced as legal evidence.

TREE MEASUREMENT INSTEAD OF LOG SCALE

Where conditions permit, national forest timber may be sold on the basis of the determination of the volume in the trees before cutting. This requires the measurement of the diameter of each tree at the time it is marked or designated for cutting, the estimate of its merchantable length or total height, checked by frequent measurements with a height measure and by measuring down trees, and the determination of its merchantable volume from previously approved volume tables. Where material is charged for on this basis a permanent record will always be made of the estimated volume of the individual tree. Diameter breast high will be measured at 4½ feet above the average ground level, unless it is known that the volume table being used was based upon diameter breast high taken at some other point, in which case the measurement will be taken as it was in preparing the table.

The volume of each tree will be recorded separately. The Tree Measurement Book, Form 285C, should be used unless the regional forester has specified the use of a local form which has been found to be more satisfactory. The instructions for the use of Form 285C provide for two alternate methods of making and recording deductions for defect (1) record of gross scale of each tree and use of a previously determined cull factor or (2) estimate and record of cull in each tree as it is marked and the gross volume is determined. Local standards will specify which method is to be used.

Trees will be marked by the usual method—blazed and stamped with marking ax, or spotted with paint. The number of the tree will be recorded on the upper blaze with crayon. This record will permit checking the man responsible for measurements by individual trees; such check will, of course, have to be made before the timber is removed.

Since stamping of the trees with the "US" stamp authorizes cutting and removal, care should be taken not

to mark more timber on a going sale than is covered by the funds on deposit. It is customary in sales large enough to justify more than one payment, to call for deposits in advance of marking and then to designate just enough trees to come safely within those deposits. (See Tree measurements, National Forest Manual.) If conditions on specific sales make it undesirable to adhere strictly to the foregoing procedure, regional foresters are authorized to permit marking in advance of payment, with the interests of the United States protected adequately by suitable provisions in the sale agreement.

Sales by tree measurement may be made for any desired product, including cordwood by the cubic foot or cord unit of measurement. Procedure in the sale of other products will be the same as outlined for sales where the board-foot unit is used.

SCALING LOGS BY INTERNATIONAL ¼-INCH LOG RULE

POLICY

Regulation S–16 provides that, if specified in the timber sale advertisement and agreement, scaling may be done by the International ¼-inch rule. This rule, table 5, appendix, applied to small timber, results in a log scale closely approximating the lumber tally if the logs are sawed in a reasonably efficient mill which practices close utilization, particularly of lumber 8 feet long and shorter. Where such conditions obtain, regional foresters may authorize experimental or standard use of this log rule on specific sales, or preferably, on all saw-timber sales on certain national forests.

The International ¼-inch rule should not be used for scaling timber for which it is obviously unsuited, such as sales of large timber which is milled in localities where economic conditions do not permit close utilization or short length lumber.

The same scaling principles apply to field use of the International ¼-inch rule in scaling national-forest timber as have been discussed on previous pages under the Scribner decimal C rule. Scaling practice, including deductions for defect, will follow the same principles. Differences in details are explained below.

THE RIGHT CYLINDER

Since the International ¼-inch rule is based on a formula which is applied to each 4-foot section of the log, and an assumed taper of one-half inch in each 4 feet (2

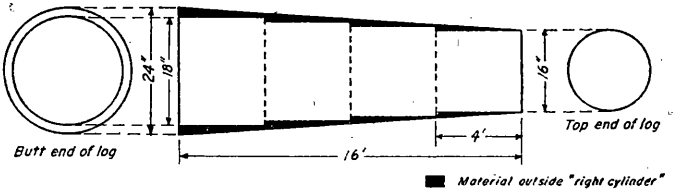

FIGURE 16.—Right cylinder conception by 4-foot sections.

inches in 16 feet), the conception of the right cylinder which must be used in applying this rule varies from that which is used with the Scribner decimal C rule. This is illustrated in figure 16. For practical purposes, however,

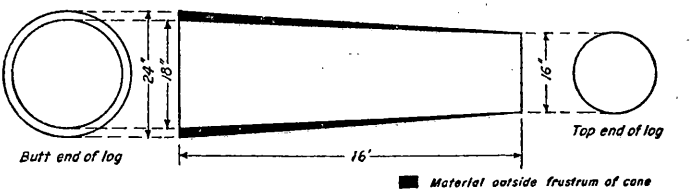

FIGURE 17.—Cone frustrum conception as substitute for right cylinder.

it may be assumed that the right cylinder becomes a frustrum of a cone with a taper of 2 inches in 16 feet, as shown in figure 17.

The International ¼-inch rule also contemplates a 1-inch collar for slab. In Forest Service scaling, therefore, no deduction will be made for defect falling outside the frustrum of a cone having a top diameter 2 inches less than the small end diameter of the log and a butt diameter 2 inches greater than the top.

On some sales the logs presented for scaling may average less taper than 2 inches in 16 feet. It is conceivable that such a condition may result in an underrun. This

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factor will be considered in appraising timber for sale, but no attempt will be made to compensate for lack of taper by allowances in scaling.

MILL OVERRUN

Normally no overrun may be expected from logs scaled by the International ¼-inch rule. In fact, mills sawing for grade or sawing entirely 1-inch stock (particularly if sawed thick) may experience a slight underrun. The minimum board contemplated by the rule contains 2 board feet. Inch lumber is considered if it is 3 inches wide by 8 feet long or any other combinations of dimensions making 2 board feet, down to 12 inches wide by 2 feet long. If a given mill does not practice such close utilization, an underrun may result.

It is important, therefore, that regions adopting this rule take steps to build up a record of actual results obtained by groups of operators sawing logs scaled by this rule, to provide a firm foundation for stumpage appraisals.

In New England, N. E. T. S. A. obtained some close checks with this rule. Varying thicknesses of lumber were produced and much of the lumber was sawed one-eighth inch overthick. There were several types of mills, varying in efficiency, and cull logs left at the receiving points—but not included in the log scale—were usually sawed. Under these conditions, 58,000,000 feet of eastern white pine logs, averaging 19.5 logs per thousand sawed at 87 sites in Massachusetts, resulted in an average overrun of 0.29 percent. Results with other species, based upon smaller quantities, showed wider variation.

LOG LENGTHS

The International ¼-inch rule was originally published for values of logs as long as 20 feet. In Forest Service scaling, logs as long as 20 feet may be scaled as one log by this rule, provided that studies show that the taper of local timber does not exceed greatly the assumed taper of 2 inches in 16 feet upon which this rule is based. Where logs from 16 to 20 feet long average 3 inches or more taper in 16 feet, the maximum scaling length

will, by stipulation in the agreement, be 16 feet, as with the Scribner decimal C rule.

For example, a 16-inch log 20 feet long scales (International ¼-inch) 235 board feet. If this log has the taper assumed in the log rule, the large end diameter will be 18½ inches. If, however, this log were representative of the average of conditions and it had an actual large-end diameter of 19¾ inches (3-inch taper in 16 feet) the agreement should provide a maximum scaling length of 16 feet, and this log would be scaled as a 16-inch 10-foot log, 110 board feet; plus an 18-inch 10-foot log, 140 board feet; or a total scale of 250 board feet.

Scaling 8½-Foot Tie Logs.

In scaling railroad tie logs cut 8½ feet long, the same principle will be followed with the International ¼-inch rule that is described on page 13 for the Scribner decimal C rule. That is, the 8½-foot log will be scaled as an 8-foot log unless the difference between the scale of an 8-foot log and a 9-foot log is 10 feet, in which case 5 feet will be added to the 8-foot scale; or if the difference is 15 feet or more, one-half the difference will be added, dropping back to the next lowest 5 feet in each case where one-half the difference does not fall on a 5-foot interval.

A 10-inch 8½-foot log will be scaled as an 8-foot log, 30 board feet; a 15-inch 8½-foot log will be scaled as an 8-foot log, 75 board feet, plus 5 feet (half the difference between the scale of an 8-foot and 9-foot log), or 80 board feet; a 17-inch 8½-foot log will be scaled as an 8-foot log, 95 board feet, plus 5 feet (half the difference between the scale of an 8-foot log and a 9-foot log, rounded down to the nearest 5 feet) or 100 board feet.

DEDUCTIONS FOR DEFECT

The standard rule for defect deduction under the Scribner decimal C rule, page 20, cannot be applied to allowances for defective material when scaling by the International ¼-inch rule, because the latter rule, in addition to allowing ¼-inch for saw kerf, includes a 1/16-inch allowance for shrinkage.

The standard rule (International ¼-inch rule) then becomes:

$$X=\frac{W''\times H''\times L'}{16}$$

Where, X=deduction, in board feet.
W''=width of defect, in inches.
H''=height of defect, in inches.
L'=length of defect, in feet.

For example, the log shown in figure 4, page 23, if scaled by the International ¼-inch rule would contain a gross scale (20-inch, 16 feet) of 290 board feet. In the case of defects which extend all the way through the log the average of the dimensions on both ends of the log should be used, since the International ¼-inch rule is based upon close utilization of small dimension material. The average diameter of the defect is $\frac{7+11}{2}=9$ inches.

One inch is allowed for sawing out defective material. The standard rule is then applied: $\frac{10\times10\times16}{16}=100$ board feet, allowance for defect. The net scale of the log is $290-100=190$ board feet.

In the appendix, page 90, is an alinement chart which may be used for determining deductions for various sized defects when scaling by the International ¼-inch rule. One inch is added to the dimensions of the defect, which are then multiplied. A straight-edge is run through the point indicated for this product on the left line, and through the length of the defect in feet on the right line. Deduction in board feet is read to the nearest 5 feet at the point where the straight-edge cuts the center line.

CUBIC MEASUREMENTS

Policy.

The cubic content of timber may be measured (1) by the cord or (2) by the cubic foot. For determining stumpage payments, cubic-foot measurements may be converted into cords or board feet in accordance with a converting factor specified in the sale agreement.

Merchantable Timber.

Standards of merchantability should be specified in sale agreements as in sales of saw timber. These standards should conform to the best trade practice for each species and class of material in the region and as far as practicable should cover the points specified on pages 9 and 10 for material measured by log scale; namely, minimum length of merchantable pieces, minimum diameter, proportion of defective material admissible, and treatment of common defects in scaling.

Requirements of Purchasers.

The requirements of purchasers will be similar to those in saw-timber sales. (See p. 11.) Ricks for cord measure must be sufficiently regular to permit reasonably accurate measurement.

In sales of shingle stock where the officer in charge may determine the number of bolts to the cord, purchasers should be required to rick bolts only in case of question as to the proper number or to check the number currently used.

Check Measurements.

Check measurements will be made in accordance with the instructions for "Check scaling," page 38. The same procedure should be followed as regards the frequency of checks in sales of varying size, the methods of conducting and reporting the check, and action to rectify the original scale.

CORD MEASURE

Policy.

Fuelwood will ordinarily be sold by the cord. Pulpwood, shake and shingle bolts, cooperage bolts, furniture bolts, acid wood, and bark may be sold by the cord or by other units of measure common in the local trade. In sales of shake or shingle bolts the unit of measure will ordinarily be the sound cord—that is, sound material equivalent to 1 cord—rather than the measured cord, which may include some defective material. This requires throwing in additional bolts to make up for defective parts of the bolts constituting a measured cord. The same rule may be followed in the case of other material sold by the

cord, if it is desirable to draw the sale agreement in this form.

If cord dimensions differing from the standard of 8 feet long, 4 feet wide, and 4 feet high, with a volume of 128 cubic feet, are to be used, they should be specified in the sale agreement, as when the long cord, 8×4×5 feet, with a volume of 160 cubic feet, is to be used for pulpwood, or sticks shorter than 4 feet are to be used for fuelwood or bolts.

Measuring Stacked Wood.

Ricks will be measured with a tape. Length will be recorded to the nearest foot, height to the nearest inch. An allowance of 1 inch per foot of height is permissible, to compensate for settling.

Where ricks are standing on slopes, the length of the rick parallel to the slope will be measured and the height at right angles to this plane. If end stakes are used, the length of ricks should be measured one-half of the distance between top and bottom; otherwise, at two or more places to obtain a fair average. The height should be measured at several places to give the true average.

Lengths should be checked sufficiently to make sure that they do not regularly overrun the allowance specified in the sale agreement. If overrun is general, the procedure should follow that outlined under penalty scale on page 37.

The contents of each rick should be determined by the Great Northern Rule, which is—

$$\frac{\text{Length of pile in feet} \times \text{height of pile in inches}}{384} = \text{Contents in}$$

48-inch wood. Deductions for defect may be made by applying the cull table printed in the back of Form 285D, Cordwood Measurement Book. This table refers to deductions for 48-inch wood. After the net scale of 48-inch wood has been obtained it can be converted to any other length of stick, if desired, by applying a converting factor, such as those listed in the back of Form 285D.

Regional foresters may specify the use of other methods of measurement of cordwood, if better adapted to local conditions. Low-value material, such as fuelwood pro-

duced in improvement cuttings may be sold by area, either on a tree measurement basis or by ocular estimate by a trained forest officer. Where such material is required to be piled for measurement, volume determination may follow local custom, such as rounding off to the nearest one-eighth cord on the basis of measurement of height and length of rick in feet, with enough checks of length of stick to make sure that the wood averages the specified length.

Stamping and Numbering.

Both the top and bottom of each rick and at least 12 pieces in each cord must be stamped. Each rick will be numbered. The measurements and contents of each rick should be entered opposite its number in the scale book. Where bolts are counted and the number per cord estimated by the forest officer, each bolt should be stamped.

CUBIC-FOOT MEASURE

Policy.

The measurement of logs in board feet is unusual except in North America. Cubic measure is customary elsewhere, and may become desirable in this country, especially for the measurement of logs or bolts which are to be manufactured by other means than by sawing into lumber. The Forest Service will sell logs, pulpwood, veneer bolts, or other products by the cubic foot of wood where this method of measurement is desired by, or acceptable to, purchasers. One acceptable form of cubic foot measurement is to convert cubic feet into cords by a suitable converting factor stipulated in the agreement.

Measurements.

Two measurements are necessary—the average diameter of the log at its middle point in inches and its total length in feet. The former may be determined by means of calipers and the latter by tape. If the log is irregular in shape the average middle diameter should be determined.

Proper deductions should be made for the thickness of the bark. Recorded diameters should be rounded off to the nearest inch above or below the actual measurement.

Logs having a diameter exactly halfway between inches will be thrown to the next lower inch.

The length of logs should be obtained in feet. Lengths should be rounded off to the nearest foot above or below the actual measurement. Logs whose length is halfway between feet should be thrown to the next lower foot. Pieces exceeding 40 feet in length should be measured as two logs of as nearly equal length as possible, and pieces exceeding 80 feet, as three logs. When pieces are measured as two or more logs the contents allowed for the separate lengths should be added and the total recorded as one log.

The volume in cubic feet may be obtained directly from table 6, appendix, which contains the solid contents of logs in cubic feet for average middle diameters from 3 to 60 inches, and for lengths from 4 to 40 feet.

Deductions for Defect.

Deductions for defect should be made, in cubic foot measurements, in accordance with the general methods discussed for scaling saw timber, page 19. The solid volume in cubic feet of waste material as determined by the surface dimensions of the defect in square or rectangular form, times its length, should be deducted from the total cubic volume of the log. Since no allowance is made for saw kerf in cubic measurement, the 20-percent reduction required in determining net loss of log scale by the board foot does not apply in this case.

Unless the appraisal was based on the conversion of the logs into lumber, no deductions should be made in cubic foot measurements for curve or sweep, crotches, or knots. Deductions should be made, however, for unsound material of any character which affects the merchantability of the log for the probable product of the sale, upon which the appraisal was based.

LINEAR MEASUREMENTS

Policy.

Lagging, posts, piling, fence poles, converter poles, telephone poles, stulls, and mine timbers may be sold by the linear foot.

Merchantable timber.

The instructions under "Definition of merchantable logs," page 9, should be followed. Timber-sale contracts should specify the minimum length and top diameter of sticks classed as merchantable for each product. Maximum lengths and diameters should be designated in contracts under which higher prices are to be paid for products cut from the larger material. It is especially necessary in sales of cedar, covering both poles and other products, to specify the dimensions of material to be used for each product.

Wherever necessary similar specifications should cover the amount and kinds of defect admissible in products sold by the linear foot or the character of the material held to be merchantable for these purposes. This is of special importance in the case of valuable products like telephone poles and stulls which usually require the best grades of timber, or sticks of limited taper. Unless Forest Service specifications are available, the current specifications of local associations of pole dealers and the like should be followed with regard to the area of defect admitted in the butts of poles of various diameters, and similar points affecting merchantability.

Requirements of Purchasers.

The requirements of purchasers will be similar to those specified on page 11. If products sold by the linear foot are to be cut in several standard lengths, purchasers may be required to pile or deck each length separately, provided this is practicable and is necessary to permit economical measurement.

Measurement.

Measurements of length only are required. Where pieces are cut in uniform, standard lengths, actual measurement is necessary only in doubtful cases and at short intervals to check the lengths employed by the choppers. When several products are cut in the same sale, or prices depend upon both diameter and length, a similar current check should be made of the diameter of linear-foot material.

The standard allowance for trimming in cutting telephone poles is 1 inch for each 5 feet of length, but regional

foresters may authorize greater allowances for specific products if local conditions necessitate such action. Penalty measurements for lengths in excess of the trimming allowance will follow the provisions of the agreement in accordance with the procedure outlined under "Penalty scale," page 36. Wherever advisable, sale agreements should specify trimming allowances for other classes of material.

Board-Foot Equivalents.

If desirable, sale agreements may specify the equivalent in a thousand feet board measure for a stated number of linear feet. This facilitates the application of a flat stumpage rate. As a standard practice, however, it is preferable to require payment on a linear-foot or piece basis.

Stamping and Numbering.

Each stick measured must be stamped on at least one end.

Each pile of material measured should be numbered with crayon in the case of lagging, posts, fence poles, converter poles, or other material individual pieces of which are small and of little value. The number of pieces in each pile and their linear-foot contents will be entered opposite the pile number in the scale book. Large pieces, like telephone poles, piling, and 16-foot stulls, equivalent in value to sawlogs, should each receive a number. The scale of each piece should be entered opposite its number in the scale book.

Check Measurements.

Check measurements will be made in accordance with the instructions for "Check scaling," page 38, and for "Check measurements," page 47.

Combined Linear and Diameter Measurements.

Where the market value of products like telephone poles and stulls varies widely in accordance with top diameter as well as length, a schedule of stumpage rates should be used for the various lengths and sizes. In such sales the top diameter of each piece must be accurately measured, an average diameter being obtained in the case of sticks of irregular shape. Diameters will be averaged

to the nearest inch, unless taking the next lower inch has been agreed upon in advance with the purchaser and is specifically required by the sale agreement. If different lengths are cut, they should be measured on not less than 25 percent of the pieces. Every piece should be given a separate number and entry in the scale book, as in the case of sawlogs.

COUNTING

Policy.

Hewn ties sold by the piece, in accordance with the standard practice of the Forest Service, will be counted. Ties will also be counted in sales where their board-foot contents are specified by the sale agreement. Where ties are scaled the instructions under scaling will be followed. Shingle bolts will be counted when contracts specify that the number of bolts to the cord will be determined by the scaler.

Lagging, poles, posts, Christmas trees, etc., will be counted when sold by the piece.

Merchantable Timber.

The instructions under "Definition of merchantable logs," page 9, will be followed unless otherwise provided in the sale agreement. Contract requirements should conform with the local market specifications of the product concerned. Special contract clauses should be used to designate unmistakably the maximum and minimum sizes of pieces which are to be counted rather than scaled. Such clauses should include any specifications as to defect or class of material necessary to establish beyond question what timber is merchantable for these products

Requirements of Purchasers.

The requirements of purchasers should be similar to those outlined on page 11.

Stamping and Numbering.

When counted, each stick of mine timbers, ties, posts, or poles must be stamped on at least one end. Christmas trees are usually counted and recorded by size classes.

Each pile of material must be numbered with crayon even though it will be removed immediately. The number of pieces will be entered opposite the number of the pile in the scale book.

Check Measurements.

Check measurements will be made in accordance with the instructions under "Check scaling," page 38, and "Check measurements," page 47.

WEIGHING

Bark, stumps, boughs, or other material which cannot be readily measured, may be sold by weight, normally with the ton as the unit, when this method accords with the best trade practice of the region. Actual weights should be obtained whenever possible, as when the products are weighed by agents of common carriers or are otherwise weighed on scales known to the forest officer to be reliable. In the absence of such an opportunity, and with material of low value, the agreement may provide for counting pieces or bundles of specified sizes and conversion to tons on a stipulated ratio, but this practically puts the sale on a piece-rate basis. If the long ton of 2,240 pounds is to be used instead of the standard ton, this must be specified in the sale agreement.

RECORDS AND REPORTS

Scale Books.

The scale or measurement of logs or other material will be entered by scalers directly in one of the following standard scale books, unless not suitable, in which case authority to use a special form of scale book should be obtained from the regional forester. These scale books are designed for scaling sawlogs, unless otherwise noted. Sample pages, with typical entries, are included in the appendix, pages 102 to 119.

Form 122. Check scale book—5,000 logs.

Form 231. Scale book—1 species column, 1,000 logs.

Form 285. Scale book—4 species columns, 10,000 logs.

Form 285A. Scale book—4 species columns, 1,000 logs.

Form 285C. Tree measurement book—4 species columns, 6,000 trees.

Form 285D. Cordwood measurement book—2 species columns, 4,000 piles.

Form 603. Sawtimber scale book—12 species columns, 600 logs.

Form 603A. Sawtimber scale book—12 species columns, 3,000 logs.

Form 603B. Sawtimber scale book—12 species columns, 6,000 logs.

Form 604. Stavebolt scale book—380 logs.

Form 648. Scale book—for linear feet, etc., 9 species columns, 192 lines.

Form 651. Scale book—5 species columns, 6,000 logs.

Form 651A. Scale book, waterproof—5 species columns, 1,200 logs.

Scale records will not be entered in other notebooks or on loose slips of paper to be transferred to scale books later, except under unusual and temporary conditions where the cost of scaling would be materially increased or the purchaser seriously inconvenienced.

Temporary scale records must be transferred to the regular scale book as soon as practicable and the temporary record fastened permanently to the page of the scale book on which the entries are made. The original scale books, after all entries have been made and checked, will be kept in the supervisor's office in all advertised sales, and in the ranger's office in unadvertised sales. Scale books with perforated pages may be used in small sales, in which case the pages for each sale may be removed from the book after the sale is completed, and filed in the sale folder.

Logs, pieces, or piles of material should be numbered and their scale, cubic contents, linear feet, number of sticks, or number of cords, with the other data called for on these forms, entered opposite each serial number in accordance with the instructions on numbering, pages 15, 49, 52, and 53.

When pieces are scaled as two or more logs the scale allowed for the separate lengths will be added and the total sum recorded as one log.

Similarly, when pieces are measured by the cubic foot as two or more logs, the dimensions of the whole piece should be entered under a single serial number, the cubic contents of the separate lengths added, and the total recorded as one log.

So far as scaling forms allow, the following information should be given for each class of material scaled, measured, or counted:

Saw timber: Serial number of each log, length, net scale, and deductions for defect.

Poles and piling (where sold on piece basis of specified length and diameter): Serial number of each piece, length, and diameter.

Cord material: Serial number of each rick, length of rick in feet and tenths, height in inches, and its contents in cords and fractions of cords.

Cubic foot material: Serial number of each log, its length in feet, net contents in cubic feet, and deductions for defect.

Linear material: Serial number of each pile and number of pieces of specified class and length.

Material counted: Serial number of each pile and number of pieces, by special class and length if necessary.

Material weighed: Number of pounds or tons with identification by car shipment or otherwise.

Where no column is provided for cull the net scale of partially defective logs will be entered in the space provided opposite the log number, and the cull deduction (enclosed in a circle thus—⑤) will be recorded in the upper left-hand corner. The gross scale of logs which are wholly cull may be handled in the same manner, except that the word "cull" or the letter "c" will be substituted for the net scale. Entries of the diameter of sawlogs and notes on the kind of defect are desirable, in addition to those specified above. They may be required in the discretion of the regional forester.

Recording Timber Cut in Land Exchange.

All logs scaled in tripartite land-exchange cases will be recorded in the regular sale scale books. No separate scale books or separate series of numbers will be maintained in such cases. If it is desired to credit part of the timber cut and scaled during a certain month to land exchange and this involves logs numbered, say, from "400 to 950" as entered in the scale book, a marginal note will be made on the scale-book pages recording these logs to the effect that they were scaled to the credit of "John Doe–Land Exchange 1–15–36."

In "stipulations" exchanges, a separate scale book or series of scale books will be used in each case. The exchange designation will be entered in the space provided for sale designation.

Check of Scale Books.

Additions in scale books will be audited, as soon as possible after field entries are made or completed, as the regional forester may direct. When errors are located in addition or computation, the needed corrections will be entered on Form 820, supplementing the last scale report of record in the sale.

Scale records must be accurate. Fairness to both the individual purchaser and the United States demands this. Whenever possible, additions should be made on recording adding machines and the tape submitted with the scale book for audit. Each regional forester will issue regional standards for scale book checks and audits, including responsibility for the work (supervisor or regional office) and specifications of the degree to which all additions and other computations must be checked. These should be based on probability of error, seriousness of errors (tied in to size of average log, and stumpage prices) and simplicity of check which will obtain the necessary accuracy at reasonable cost.

Cutting Reports.

The forest officer in charge will notify the supervisor when cutting begins on any supervisor's or larger sale. The scale in all such sales will be reported to the supervisor on Form 820 or Form 820a and a duplicate retained in the ranger's files, except that in unadvertised sales only the final report is necessary unless periodic reports are required by regional standard. Cutting reports will be submitted while work is in progress, covering periods of 1, 2, 3, or 4 weeks, as may be required by the supervisor, but ordinarily ending on Saturday. On forests where a number of sales are in operation dates may be set upon which all cutting reports shall be submitted. So far as practicable the wishes and needs of purchasers should be met in fixing dates for the submission of reports.

In ranger's sales only the final report need be submitted to the supervisor, usually on Form 202c.

Reporting Timber Cut in Land Exchanges.

In reporting timber cut from sales involving tripartite land exchanges, all material cut, including that to be used for exchange, will be reported in the usual way and Form 820 or Form 820a will show the total amount of money deposited by the purchaser, segregated between "deposits to sale" and "land exchange credits." A separate cutting report, Form 820 or Form 820a, will be prepared including only the logs designated in the scale book as scaled to satisfy the land-exchange credit. The amount shown under "Land Exchange Credits" should be the sum total of all credits deposited to cover the cost of land which the Government has acquired. These cutting reports will be numbered beginning as "L–1." Many exchanges are so small that but one cutting report will be needed for each case. On the front of this special cutting report should appear the case designation of the timber sale and beneath this the designation of the land-exchange case. On the back of the form should appear a notation substantially as follows:

This report covers the scale of logs numbered ____ to ____, inclusive, as shown on pages ____ to ____, in scale book number ____ in the timber sale designated _____.

If this report covers all the timber to be cut on a particular exchange, the notation should say so. It should be observed that this special cutting report duplicates timber that has already been reported on the regular timber-sale cutting report (Form 820). The officer making out the report will prepare the special Form 820 in quadruplicate, furnishing three copies to the supervisor, of which two copies must be signed by both reporting and approving officers, and one copy forwarded by the supervisor to the regional office.

In "stipulations" exchanges, the procedure will be the same, except that, since no timber sale is involved, all timber cut will be credited to "land exchange credits" on Form 820 or Form 820a, which will be filed only in the land exchange files.

Damage and Waste-Scale Reports.

Damage and waste scale (both previous and current) will be reported in appropriate indicated spaces on Form 820 or Form 820a. The circumstances of the damage and

waste scale should be fully explained under "Remarks," or by separate letter to the supervisor, for periods during which a damage and waste scale has been made.

Check and Record of Cutting Reports.

As cutting reports (Form 820 or Form 820a) are received, they should be compared with the timber-sales record card (Form 615) for errors in entries brought forward from the last report and for the correctness of the rates. All calculations will be checked and the information regarding the progress of the sale scrutinized. The date of the report, quantity of each class of material cut, reduced to feet, board measure, by approved converting factors, and total value of material cut since the last report and to date will be entered on the record card. The total value of the cut to date will be compared with the total deposits to prevent cutting in excess of payments.

Cutting reports on sales involving tripartite land exchange, and on "stipulations" land exchange cuttings will be recorded on Form 615a. Especial care is necessary to avoid confusion in these cases. In "stipulations" exchanges, the record will be handled as if the case were a sale with advance payment in full.

Scale Records for Purchasers.

Upon request, copies or abstracts of cutting reports will be furnished purchasers after approval by the supervisor. If copies of Form 820 or Form 820a are sent, the entries on the back will be omitted. In the discretion of the officer in charge or of the supervisor, the scale record may be opened to the purchaser at any time, but in order to avoid arguments concerning individual logs it is advisable to furnish purchasers with the total net scale of not less than 100 logs. The merchantable content of individual logs cannot always be determined with exactness, and it must be appreciated by purchasers that average figures rather than the scale of individual logs must finally determine the accuracy of the scale.

Reports of the cut by subdivision of a sale area, such as the output of various subcontractors, ordinarily will not be furnished purchasers, but this may be done with

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the approval of the supervisor if no sacrifice of time that could be used to advantage is involved and if no interference with other duties will result. In no case will the scale of individual logs be copied on forms or in books furnished by the purchaser, as is sometimes requested in order to figure the scale by another log rule.

Report of Timber Cut and Sold.

Reports on Form 949 will be sent to the regional forester by the supervisor monthly or quarterly, as may be required by the regional forester. This report will be mailed not later than the 5th of the succeeding month, even if no timber has been cut or sold during the month or quarter covered by the report. It will be compiled from all Forms 615, 615a, 202c, and 202d, which will not be placed in the closed records until after the preparation of this report. All timber for which payment is made, whether cut in sales, administrative use, or settlements, or scaled under the provisions for damage and waste scale, will be included. The date of approval of the agreement or stipulation will be taken in each case as the date of sale, even though an emergency sale may have been allowed, and the date of receipt of each cutting report will be taken as the date of cutting. All data will be checked before the report is forwarded. Green and dead timber need not be reported separately, except as required by the regional forester.

The amount and value of the timber cut and sold, respectively, in sales at cost will be reported separately. The amount cut in exchange cuttings will also be reported separately.

The report should include a statement of the amount of timber previously reported as sold which will not be cut, owing to expirations, cancelations, or modifications of agreements during the period covered by the report provided the total exceeds 500,000 board feet or its equivalent. Timber resold immediately after the expiration or cancelation of a contract (see first paragraph under "When of advantage to the United States or not prejudicial to its interests," pp. 104–105, National Forest Manual) will not be so reported nor will it be reported as timber sold.

It will not be necessary to include in this statement the "overcut" or "undercut" in sales which were completed during the quarter.

Regional Forester's Quarterly Report.

As soon as practicable after the first of each quarter the regional forester will report to the chief of the Forest Service the amount and value of timber cut and sold separately during the preceding quarter on each forest in the region. Separate tabulation for sales at cost and exchange cuttings should be included. The report should also include a statement of the amount of timber previously reported as sold which will not be cut, owing to expirations, cancelations, or modifications of contracts during the quarter, as reported by supervisors.

Report on Miscellaneous Products.

Sales of miscellaneous forest products not convertible into board feet, such as Christmas trees, naval stores, tanbark, seedlings, etc., and the amounts removed should be reported in the spaces provided on Form 949 and, in the regional forester's report, in a footnote. So far as possible, however, the volumes of all classes of materials should be reduced to thousand feet board measure by the use of the standard converting factors.

APPENDIX

TABLE 1.—*Scribner Decimal C log rule*

8- TO 16-FOOT LOGS

Diameter, inches	Length—feet								
	8	9	10	11	12	13	14	15	16
	Contents—board feet in tens								
6	0.5	0.5	1	1	1	1	1	1	2
7	1	1	1	2	2	2	2	2	3
8	1	1	2	2	2	2	2	2	3
9	2	2	3	3	3	3	3	3	4
10	3	3	3	3	3	4	4	5	6
11	3	3	4	4	4	5	5	6	7
12	4	4	5	5	6	6	7	7	8
13	5	5	6	7	7	8	8	9	10
14	6	6	7	8	9	9	10	11	11
15	7	8	9	10	11	12	12	13	14
16	8	9	10	11	12	13	14	15	16
17	9	10	12	13	14	15	16	17	18
18	11	12	13	15	16	17	19	20	21
19	12	13	15	16	18	19	21	22	24
20	14	16	17	19	21	23	24	26	28
21	15	17	19	21	23	25	27	28	30
22	17	19	21	23	25	27	29	31	33
23	19	21	23	26	28	31	33	35	38
24	21	23	25	28	30	33	35	38	40
25	23	26	29	31	34	37	40	43	46
26	25	28	31	34	37	41	44	47	50
27	27	31	34	38	41	44	48	51	55
28	29	33	36	40	44	47	51	54	58
29	31	35	38	42	46	49	53	57	61
30	33	37	41	45	49	53	57	62	66
31	36	40	44	49	53	58	62	67	71
32	37	41	46	51	55	60	64	69	74
33	39	44	49	54	59	64	69	73	78
34	40	45	50	55	60	65	70	75	80
35	44	49	55	60	66	71	77	82	88
36	46	52	58	63	69	75	81	86	92
37	51	58	64	71	77	84	90	96	103
38	54	60	67	73	80	87	93	100	107
39	56	63	70	77	84	91	98	105	112
40	60	68	75	83	90	98	105	113	120
41	64	72	79	87	95	103	111	119	127
42	67	76	84	92	101	109	117	126	134
43	70	79	87	96	105	113	122	131	140
44	74	83	93	102	111	120	129	139	148
45	76	85	95	104	114	123	133	143	152
46	79	89	99	109	119	129	139	149	159
47	83	93	104	114	124	134	145	155	166
48	86	97	108	119	130	140	151	162	173
49	90	101	112	124	135	146	157	168	180
50	94	105	117	129	140	152	164	175	187

APPENDIX

TABLE 1.—*Scribner Decimal C log rule*—Continued

17- TO 32-FOOT LOGS

Diameter, inches	Length—feet								
	17	18	20	22	24	26	28	30	32
	Contents—board feet in tens								
6	2	2	2	3	3	3	4	4	5
7	3	3	3	4	4	4	5	5	6
8	3	3	3	4	4	5	6	6	7
9	4	4	4	5	6	6	7	8	9
10	6	6	7	8	9	9	10	11	12
11	7	8	8	9	10	11	12	13	14
12	8	9	10	11	12	13	14	15	16
13	10	11	12	13	15	16	17	18	19
14	12	13	14	16	17	19	20	21	23
15	15	16	18	20	21	23	25	27	28
16	17	18	20	22	24	26	28	30	32
17	20	21	23	25	28	30	32	35	37
18	23	24	27	29	32	35	37	40	43
19	25	27	30	33	36	39	42	45	48
20	30	31	35	38	42	45	49	52	56
21	32	34	38	42	46	49	53	57	61
22	35	38	42	46	50	54	58	63	67
23	40	42	47	52	57	61	66	71	75
24	43	45	50	55	61	66	71	76	81
25	49	52	57	63	69	75	80	86	92
26	53	56	62	69	75	82	88	94	100
27	58	62	68	75	82	89	96	103	110
28	62	65	73	80	87	95	102	109	116
29	65	68	76	84	91	99	107	114	122
30	70	74	82	90	99	107	115	123	131
31	75	80	89	98	106	115	124	133	142
32	78	83	92	101	110	120	129	138	147
33	83	88	98	108	118	127	137	147	157
34	85	90	100	110	120	130	140	150	160
35	93	98	109	120	131	142	153	164	175
36	98	104	115	127	138	150	161	173	185
37	109	116	129	142	154	167	180	193	206
38	113	120	133	147	160	174	187	200	214
39	119	126	140	154	168	182	196	210	224
40	128	135	150	166	181	196	211	226	241
41	135	143	159	175	191	207	223	238	254
42	143	151	168	185	201	218	235	252	269
43	148	157	174	192	209	227	244	262	279
44	157	166	185	204	222	241	259	278	296
45	161	171	190	209	228	247	266	286	304
46	169	178	198	218	238	258	278	297	317
47	176	186	207	228	248	269	290	310	331
48	184	194	216	238	260	281	302	324	346
49	191	202	225	247	270	292	314	337	359
50	199	211	234	257	281	304	328	351	374

TABLE 1.—*Scribner Decimal C log rule*—Continued

8- TO 16-FOOT LOGS

Diameter, inches	Length—feet								
	8	9	10	11	12	13	14	15	16
	Contents—board feet in tens								
51	97	110	122	134	146	158	170	183	195
52	101	114	127	139	152	165	177	190	202
53	105	118	132	145	158	171	184	197	210
54	109	123	137	150	164	177	191	205	218
55	113	127	142	156	170	184	198	212	227
56	118	132	147	162	176	191	206	220	235
57	122	137	152	167	183	198	213	228	244
58	126	142	158	174	189	205	221	237	252
59	131	147	163	180	196	212	229	245	261
60	135	152	169	186	203	220	237	253	270
61	140	158	175	193	210	228	245	263	280
62	145	163	181	199	217	235	253	271	289
63	149	168	187	205	224	243	261	280	299
64	154	174	193	213	232	251	270	290	309
65	159	179	199	219	239	259	279	299	319
66	164	185	206	226	247	268	288	309	329
67	170	191	212	233	254	275	297	318	339
68	175	197	219	240	262	284	306	328	350
69	180	203	226	248	271	294	316	339	361
70	186	209	232	256	279	302	325	349	372
71	192	215	240	263	287	311	335	359	383
72	197	222	247	271	296	321	345	370	395
73	203	229	254	280	305	330	356	381	406
74	209	236	261	288	314	340	366	393	418
75	215	242	269	296	323	350	377	404	430
76	221	249	277	304	332	360	387	415	443
77	228	256	285	313	341	369	398	426	455
78	234	263	293	322	351	380	410	439	468
79	240	271	301	331	361	391	421	451	481
80	247	278	309	340	371	402	432	464	494
81	254	286	317	349	381	413	444	476	508
82	261	293	326	358	391	424	456	489	521
83	268	301	335	368	401	434	468	501	535
84	275	309	343	378	412	446	481	515	549
85	281	316	351	386	421	456	491	526	561
86	287	323	359	395	431	467	503	539	575
87	295	332	368	405	442	479	516	553	589
88	301	339	377	414	452	490	527	565	603
89	308	347	385	424	462	501	539	578	616
90	315	354	393	433	472	511	551	590	629
91	322	362	402	443	483	523	563	604	644
92	329	370	411	452	493	534	575	616	657
93	335	377	419	461	503	545	587	629	671
94	343	386	428	471	514	557	600	643	685
95	350	394	437	481	525	569	612	656	700
96	357	402	446	491	536	581	625	670	715
97	364	410	455	501	546	592	637	683	728
98	371	418	464	511	557	603	650	696	743
99	379	426	473	521	568	615	663	710	757
100	386	434	482	531	579	627	675	724	772

TABLE 1.—*Scribner Decimal C log rule*—Continued

17- TO 32-FOOT LOGS

Diameter, inches	Length—feet								
	17	18	20	22	24	26	28	30	32
	Contents—board feet in tens								
51	207	219	243	268	292	315	341	365	389
52	215	228	253	278	304	329	354	380	405
53	224	237	263	289	316	341	368	395	421
54	232	246	273	300	328	355	382	410	437
55	241	255	283	312	340	368	397	425	453
56	250	264	294	323	353	382	411	441	470
57	259	274	304	335	365	396	426	457	487
58	268	284	315	347	379	410	442	473	505
59	278	294	327	359	392	425	457	490	523
60	287	304	338	372	406	439	473	507	541
61	298	315	350	385	420	455	490	525	560
62	307	325	362	398	434	470	506	542	579
63	317	336	373	411	448	485	523	560	597
64	329	348	387	425	464	503	541	580	619
65	339	358	398	438	478	518	558	597	637
66	350	370	412	453	494	535	576	617	659
67	360	381	423	466	508	550	593	635	677
68	371	393	437	480	524	568	611	655	699
69	384	406	452	497	542	587	632	677	723
70	395	419	465	512	558	605	651	698	744
71	407	430	478	526	574	622	670	717	765
72	419	444	493	543	592	641	691	740	789
73	432	457	508	559	610	661	712	762	813
74	445	471	523	576	628	680	733	785	837
75	458	484	538	592	646	700	754	807	861
76	470	498	553	609	664	719	775	830	885
77	483	511	568	625	682	739	796	852	909
78	497	527	585	644	702	761	819	878	936
79	511	541	602	662	722	782	842	902	963
80	526	556	618	680	742	804	866	927	989
81	540	572	635	699	762	826	889	953	1,016
82	554	586	652	717	782	847	912	977	1,043
83	568	601	668	735	802	869	936	1,002	1,069
84	584	618	687	755	824	893	961	1,030	1,099
85	596	631	702	772	842	912	982	1,052	1,123
86	611	646	718	790	862	934	1,006	1,077	1,149
87	626	663	737	810	884	958	1,031	1,105	1,179
88	640	678	753	829	904	979	1,055	1,130	1,205
89	655	693	770	847	924	1,001	1,078	1,155	1,232
90	669	708	787	865	944	1,023	1,101	1,180	1,259
91	684	725	805	886	966	1,047	1,127	1,208	1,288
92	698	740	822	904	986	1,068	1,150	1,233	1,315
93	713	755	838	922	1,006	1,090	1,174	1,258	1,341
94	728	771	857	942	1,028	1,114	1,199	1,285	1,371
95	744	788	875	963	1,050	1,138	1,225	1,313	1,400
96	759	804	893	983	1,072	1,161	1,251	1,340	1,429
97	774	819	910	1,001	1,092	1,183	1,274	1,365	1,456
98	789	836	928	1,021	1,114	1,207	1,300	1,392	1,485
99	805	852	947	1,041	1,136	1,231	1,325	1,420	1,515
100	820	869	965	1,062	1,158	1,255	1,351	1,448	1,544

TABLE 1.—*Scribner Decimal C log rule*—Continued

8- TO 16-FOOT LOGS

Diameter, inches	Length—feet								
	8	9	10	11	12	13	14	15	16
	Contents—board feet in tens								
101	393	443	492	541	590	639	688	738	787
102	401	452	502	552	602	652	702	753	803
103	409	461	512	563	614	665	716	768	819
104	417	470	522	574	626	678	730	783	835
105	425	479	532	585	638	691	744	798	851
106	433	488	542	596	650	704	758	813	867
107	442	497	553	608	663	718	773	829	884
108	450	506	563	619	675	731	788	844	900
109	459	516	573	631	688	745	803	860	917
110	467	525	583	642	700	758	817	875	933
111	475	535	594	654	713	772	832	891	951
112	483	544	604	665	725	785	846	906	967
113	492	554	615	677	738	800	861	923	984
114	501	563	626	688	751	814	876	939	1,001
115	509	573	637	700	764	828	891	955	1,019
116	519	584	648	713	778	843	908	973	1,037
117	528	594	660	726	792	858	924	990	1,056
118	537	605	672	739	806	873	940	1,008	1,075
119	547	615	683	752	820	888	957	1,025	1,093
120	556	626	695	765	834	904	973	1,043	1,112

34- TO 40-FOOT LOGS

Diameter, inches	Length—feet				Diameter, inches	Length—feet			
	34	36	38	40		34	36	38	40
	Contents—board feet in tens					Contents—board feet in tens			
6	5	6	6	7	22	71	75	79	84
7	6	6	6	7	23	80	85	89	94
8	7	8	8	9	24	86	91	96	101
9	10	10	11	12	25	98	103	109	115
					26	106	112	119	125
					27	116	123	130	137
10	13	14	14	15	28	124	131	138	146
11	15	16	17	18	29	129	137	145	152
12	17	18	19	20					
13	21	22	23	24	30	140	148	156	164
14	24	26	27	29	31	151	160	169	178
15	30	32	34	36	32	156	166	175	184
16	34	36	38	40	33	167	176	186	196
17	39	42	44	46	34	170	180	190	200
18	45	48	51	53	35	186	197	208	219
19	51	54	57	60	36	196	208	219	230
					37	218	232	244	258
20	60	63	66	70	38	226	240	254	266
21	65	68	72	76	39	238	252	266	280

TABLE 1.—*Scribner Decimal C log rule*—Continued

17- TO 32-FOOT LOGS

Diameter, inches	Length—feet								
	17	18	20	22	24	26	28	30	32
	Contents—board feet in tens								
101	836	885	983	1,082	1,180	1,278	1,377	1,475	1,573
102	853	903	1,003	1,104	1,204	1,304	1,405	1,505	1,605
103	870	921	1,023	1,126	1,228	1,330	1,433	1,535	1,637
104	887	939	1,043	1,148	1,252	1,356	1,461	1,565	1,669
105	904	957	1,063	1,170	1,276	1,382	1,489	1,595	1,701
106	921	975	1,083	1,192	1,300	1,408	1,517	1,625	1,733
107	939	995	1,105	1,216	1,326	1,437	1,547	1,658	1,768
108	956	1,013	1,125	1,238	1,350	1,463	1,575	1,688	1,800
109	957	1,032	1,147	1,261	1,376	1,491	1,605	1,720	1,835
110	992	1,050	1,167	1,283	1,400	1,517	1,633	1,750	1,867
111	1,010	1,070	1,188	1,307	1,426	1,545	1,664	1,783	1,901
112	1,027	1,088	1,208	1,329	1,450	1,571	1,692	1,813	1,933
113	1,046	1,107	1,230	1,353	1,476	1,599	1,722	1,845	1,968
114	1,064	1,127	1,252	1,377	1,502	1,627	1,752	1,878	2,003
115	1,082	1,146	1,273	1,401	1,528	1,655	1,783	1,910	2,037
116	1,102	1,167	1,297	1,426	1,556	1,686	1,815	1,945	2,075
117	1,122	1,188	1,320	1,452	1,584	1,716	1,848	1,980	2,112
118	1,142	1,209	1,343	1,478	1,612	1,746	1,881	2,015	2,149
119	1,162	1,230	1,367	1,503	1,640	1,777	1,913	2,050	2,187
120	1,182	1,251	1,390	1,529	1,668	1,807	1,946	2,085	2,224

34- TO 40-FOOT LOGS

Diameter, inches	Length—feet				Diameter, inches	Length—feet			
	34	36	38	40		34	36	38	40
	Contents—board feet in tens					Contents—board feet in tens			
40	256	270	286	300	60	575	608	642	676
41	270	286	302	318	61	594	629	664	699
42	286	302	318	336	62	614	650	687	723
43	296	314	332	348	63	635	672	710	746
44	314	332	352	370	64	656	694	733	772
45	322	342	360	380	65	677	717	757	796
46	338	356	376	396	66	699	740	781	822
47	352	372	394	414	67	721	763	806	848
48	368	388	410	432	68	744	787	831	875
49	382	404	427	449	69	767	812	857	902
50	398	421	445	468	70	790	837	883	930
51	414	438	462	487	71	814	862	910	958
52	430	455	481	506	72	838	888	937	986
53	447	473	500	526	73	864	914	965	1,016
54	464	491	519	546	74	889	941	993	1,046
55	481	510	538	566	75	915	968	1,022	1,076
56	500	529	558	588	76	941	996	1,051	1,107
57	518	548	578	609	77	967	1,024	1,081	1,138
58	536	568	599	631	78	994	1,053	1,112	1,170
59	555	588	620	653	79	1,022	1,082	1,142	1,202

TABLE 1.—*Scribner Decimal C log rule*—Continued

34- TO 40-FOOT LOGS—Continued

Diameter, inches	Length—feet				Diameter, inches	Length—feet			
	34	36	38	40		34	36	38	40
	Contents—board feet in tens					Contents—board feet in tens			
80	1,050	1,112	1,174	1,236	100	1,640	1,738	1,834	1,930
81	1,078	1,142	1,205	1,269	101	1,672	1,770	1,868	1,966
82	1,108	1,173	1,238	1,303	102	1,706	1,806	1,906	2,006
83	1,137	1,202	1,271	1,338	103	1,740	1,842	1,944	2,046
84	1,167	1,236	1,305	1,373	104	1,774	1,878	1,982	2,086
85	1,192	1,262	1,334	1,404	105	1,808	1,914	2,020	2,126
86	1,222	1,292	1,364	1,436	106	1,842	1,950	2,058	2,166
87	1,252	1,326	1,400	1,474	107	1,878	1,990	2,100	2,210
88	1,280	1,356	1,432	1,506	108	1,912	2,026	2,138	2,250
89	1,310	1,386	1,464	1,540	109	1,950	2,064	2,178	2,294
90	1,338	1,416	1,494	1,574	110	1,984	2,100	2,216	2,334
91	1,368	1,450	1,530	1,610	111	2,020	2,140	2,258	2,376
92	1,396	1,480	1,562	1,644	112	2,054	2,176	2,296	2,416
93	1,426	1,510	1,592	1,676	113	2,092	2,214	2,338	2,460
94	1,456	1,542	1,628	1,714	114	2,128	2,254	2,378	2,504
95	1,488	1,576	1,662	1,750	115	2,164	2,292	2,420	2,546
96	1,518	1,608	1,698	1,786	116	2,204	2,334	2,464	2,594
97	1,548	1,638	1,730	1,820	117	2,244	2,376	2,508	2,640
98	1,578	1,672	1,764	1,856	118	2,284	2,418	2,552	2,686
99	1,610	1,704	1,798	1,894	119	2,324	2,460	2,596	2,734
					120	2,364	2,502	2,642	2,780

TABLE 2.—*Scribner Decimal C log rule*

2- TO 8-FOOT BOLTS

Diameter, inches	Length—feet						
	2	3	4	5	6	7	8
	Contents—board feet in tens						
12	1	1	2	2	3	3	4
13	1	2	2	3	4	4	5
14	1	2	3	4	4	5	6
15	2	3	4	4	5	6	7
16	2	3	4	5	6	7	8
17	2	3	5	6	7	8	9
18	3	4	5	7	8	9	11
19	3	4	6	8	9	10	12
20	4	5	7	9	11	12	14
21	4	6	8	10	12	13	15
22	4	6	8	10	13	15	17
23	5	7	9	12	14	16	19
24	5	8	10	13	15	18	21
25	6	9	11	14	17	20	23
26	6	9	12	16	19	22	25
27	7	10	14	17	21	24	27
28	7	11	15	18	22	25	29
29	8	11	15	19	23	27	31
30	8	12	16	21	25	29	33
31	9	13	18	22	27	31	36
32	9	14	18	23	28	32	37
33	10	15	20	24	29	34	39
34	10	15	20	25	30	35	40
35	11	16	22	27	33	38	44
36	12	17	23	29	35	40	46
37	13	19	26	32	39	45	51
38	13	20	27	33	40	47	54
39	14	21	28	35	42	49	56
40	15	23	30	38	45	53	60

TABLE 3.—*Deduction for rectangular defects—Scribner Decimal C log rule*

[20 percent deducted for kerf from solid board-foot contents]

End dimensions, inches	Length of defect—feet																
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Contents—board feet in tens																
2 x 3	---	---	---	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	1
4	---	0.5	0.5	.5	.5	.5	.5	.5	.5	.5	.5	1	1	1	1	1	1
5	0.5	.5	.5	.5	.5	.5	.5	1	1	1	1	1	1	1	1	1	1
6	.5	.5	.5	.5	.5	.5	1	1	1	1	1	1	1	1	1	2	2
7	.5	.5	.5	.5	.5	1	1	1	1	1	1	1	1	2	2	2	2
3 x 4	.5	.5	.5	.5	.5	.5	1	1	1	1	1	1	1	1	1	2	2
5	.5	.5	.5	.5	1	1	1	1	1	1	1	2	2	2	2	2	2
6	.5	.5	.5	1	1	1	1	1	1	2	2	2	2	2	2	2	2
7	.5	.5	1	1	1	1	1	2	2	2	2	2	2	2	3	3	3
8	.5	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3
9	.5	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	4
10	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4
11	1	1	1	2	2	2	2	2	3	3	3	3	4	4	4	4	4
4 x 5	.5	.5	1	1	1	1	1	1	2	2	2	2	2	2	2	3	3
6	.5	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3
7	.5	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4
8	1	1	1	1	2	2	2	2	3	3	3	3	3	4	4	4	4
9	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5
10	1	1	2	2	2	2	3	3	3	3	4	4	4	5	5	5	5
11	1	1	2	2	2	3	3	3	4	4	4	4	5	5	5	6	6
12	1	2	2	2	3	3	3	4	4	4	4	5	5	5	6	6	6
13	1	2	2	2	3	3	3	4	4	5	5	5	6	6	6	7	7
5 x 6	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4
7	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	4	5
8	1	1	2	2	2	2	3	3	3	3	4	4	4	5	5	5	5
9	1	2	2	2	2	3	3	3	4	4	4	4	5	5	5	6	6
10	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6	6	7
11	1	2	2	3	3	3	4	4	4	5	5	6	6	6	7	7	7
12	2	2	2	3	3	4	4	4	5	5	6	6	6	7	7	8	8
13	2	2	3	3	3	4	4	5	5	6	6	6	7	7	8	8	9
14	2	2	3	3	4	4	5	5	6	6	7	7	7	8	8	9	9
15	2	2	3	4	4	4	5	6	6	6	7	8	8	8	9	10	10
16	2	3	3	4	4	5	5	6	6	7	7	8	9	9	10	10	11
6 x 7	1	1	2	2	2	3	3	3	3	4	4	4	4	5	5	5	6
8	1	2	2	2	3	3	3	4	4	4	4	5	5	5	6	6	6
9	1	2	2	3	3	3	4	4	4	5	5	5	6	6	6	7	7
10	2	2	2	3	3	4	4	4	5	5	6	6	6	7	7	8	8
11	2	2	3	3	4	4	4	5	5	6	6	7	7	7	8	8	9
12	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10
13	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10
14	2	3	3	4	4	5	6	6	7	7	8	8	9	10	10	11	11
15	2	3	4	4	5	5	6	7	7	8	8	9	10	10	11	11	12
16	3	3	4	4	5	6	6	7	8	8	9	10	10	11	12	12	13
17	3	3	4	5	5	6	7	7	8	9	10	10	11	12	12	13	14
18	3	4	4	5	6	6	7	8	9	9	10	11	12	12	13	14	14
19	3	4	5	5	6	7	8	8	9	10	11	11	12	13	14	14	15
20	3	4	5	6	6	7	8	9	10	10	11	12	13	14	14	15	16
21	3	4	5	6	7	8	8	9	10	11	12	13	13	14	15	16	17
22	4	4	5	6	7	8	9	10	11	11	12	13	14	15	16	17	18

TABLE 3.—*Deduction for rectangular defects—Scribner Decimal C log rule*

[20 percent deducted for kerf from solid board-foot contents]

End dimensions, inches	Length of defect—feet															
	21	22	23	24	25	26	27	28	29	30	31	32	34	36	38	40
	Contents—board feet in tens															
2 x 3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2
4	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2
5	1	1	2	2	2	2	2	2	2	2	2	2	2	2	3	3
6	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3
7	2	2	2	2	2	2	3	3	3	3	3	3	3	3	4	4
3 x 4	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3
5	2	2	2	2	2	3	3	3	3	3	3	3	3	4	4	4
6	3	3	3	3	3	3	3	3	3	4	4	4	4	4	5	5
7	3	3	3	3	4	4	4	4	4	4	4	4	5	5	5	6
8	3	4	4	4	4	4	4	4	5	5	5	5	5	6	6	6
9	4	4	4	4	4	5	5	5	5	5	6	6	6	6	7	7
10	4	4	5	5	5	5	5	6	6	6	6	6	7	7	8	8
11	5	5	5	5	6	6	6	6	6	7	7	7	7	8	8	9
4 x 5	3	3	3	3	3	3	4	4	4	4	4	4	5	5	5	5
6	3	4	4	4	4	4	4	4	5	5	5	5	5	6	6	6
7	4	4	4	4	5	5	5	5	5	6	6	6	6	7	7	7
8	4	5	5	5	5	6	6	6	6	6	7	7	7	8	8	9
9	5	5	6	6	6	6	6	7	7	7	7	8	8	9	9	10
10	6	6	6	6	7	7	7	7	8	8	8	9	9	10	10	11
11	6	6	7	7	7	8	8	8	9	9	9	9	10	11	11	12
12	7	7	7	8	8	8	9	9	9	10	10	10	11	12	12	13
13	7	8	8	8	9	9	9	10	10	10	11	11	12	12	13	14
5 x 6	4	4	5	5	5	5	5	6	6	6	6	6	7	7	8	8
7	5	5	5	6	6	6	6	7	7	7	7	7	8	8	9	9
8	6	6	6	6	7	7	7	7	8	8	8	9	9	10	10	11
9	6	7	7	7	8	8	8	8	9	9	9	10	10	11	11	12
10	7	7	8	8	8	9	9	9	10	10	10	11	11	12	13	13
11	8	8	8	9	9	10	10	10	11	11	11	12	12	13	14	15
12	8	9	9	10	10	10	11	11	12	12	12	13	14	14	15	16
13	9	10	10	10	11	11	12	12	13	13	13	14	15	16	16	17
14	10	10	11	11	12	12	13	13	14	14	14	15	16	17	18	19
15	10	11	12	12	12	13	14	14	14	15	16	16	17	18	19	20
16	11	12	12	13	13	14	14	15	15	16	17	17	18	19	20	21
6 x 7	6	6	6	7	7	7	8	8	8	8	9	9	10	10	11	11
8	7	7	7	8	8	8	9	9	9	10	10	10	11	12	12	13
9	8	8	8	9	9	9	10	10	10	11	11	12	12	13	14	14
10	8	9	9	10	10	10	11	11	12	12	12	13	14	14	15	16
11	9	10	10	11	11	11	12	12	13	13	14	14	15	16	17	18
12	10	11	11	12	12	12	13	13	14	14	15	15	16	17	18	19
13	11	11	12	12	13	14	14	15	15	16	16	17	18	19	20	21
14	12	12	13	13	14	15	15	16	16	17	17	18	19	20	21	22
15	13	13	14	14	15	16	16	17	17	18	19	19	20	22	23	24
16	13	14	15	15	16	17	17	18	19	19	20	20	22	23	24	26
17	14	15	16	16	17	18	18	19	20	20	21	22	23	24	26	27
18	15	16	17	17	18	19	19	20	21	22	22	23	24	26	27	29
19	16	17	17	18	19	20	21	21	22	23	24	24	26	27	29	30
20	17	18	18	19	20	21	22	22	23	24	25	26	27	29	30	32
21	18	18	19	20	21	22	23	24	24	25	26	27	29	30	32	34
22	18	19	20	21	22	23	24	25	26	26	27	28	30	32	33	35

TABLE 3.—*Deduction for rectangular defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet																
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Contents—board feet in tens																
7 x 8	1	2	2	3	3	3	4	4	4	5	5	6	6	6	7	7	7
9	2	2	3	3	3	4	4	5	5	5	6	6	7	7	8	8	8
10	2	2	3	3	4	4	5	5	6	6	7	7	7	8	8	9	9
11	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10
12	2	3	3	4	4	5	6	6	7	7	8	8	9	10	10	11	11
13	2	3	4	4	5	5	6	7	7	8	8	9	10	10	11	12	12
14	3	3	4	5	5	6	7	7	8	8	9	10	10	11	12	12	13
15	3	4	4	5	6	6	7	8	8	9	10	10	11	12	13	13	14
16	3	4	4	5	6	7	7	8	9	10	10	11	12	13	13	14	15
17	3	4	5	6	6	7	8	9	10	10	11	12	13	13	14	15	16
18	3	4	5	6	7	8	8	9	10	11	12	13	13	14	15	16	17
19	4	4	5	6	7	8	9	10	11	12	12	13	14	15	16	17	18
20	4	5	6	7	7	8	9	10	11	12	13	14	15	16	17	18	19
21	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
22	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	21
23	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21
24	4	6	7	8	9	10	11	12	13	15	16	17	18	19	20	21	22
8 x 9	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10
10	2	3	3	4	4	5	5	6	6	7	7	8	9	9	10	10	11
11	2	3	4	4	5	5	6	6	7	8	8	9	9	10	11	11	12
12	3	3	4	4	5	6	6	7	8	8	9	10	10	11	12	12	13
13	3	3	4	5	6	6	7	8	8	9	10	10	11	12	12	13	14
14	3	4	4	5	6	7	7	8	9	10	10	11	12	13	13	14	15
15	3	4	5	6	6	7	8	9	10	10	11	12	13	14	14	15	16
16	3	4	5	6	7	8	9	9	10	11	12	13	14	15	15	16	17
17	4	5	5	6	7	8	9	10	11	12	13	14	15	15	16	17	18
18	4	5	6	7	8	9	10	11	12	12	13	14	15	16	17	18	19
19	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
20	4	5	6	7	9	10	11	12	13	14	15	16	17	18	19	20	21
21	4	6	7	8	9	10	11	12	13	15	16	17	18	19	20	21	22
22	5	6	7	8	9	11	12	13	14	15	16	18	19	20	21	22	23
23	5	6	7	9	10	11	12	13	15	16	17	18	20	21	22	23	25
24	5	6	8	9	10	12	13	14	15	17	18	19	20	22	23	24	26
25	5	7	8	9	11	12	13	15	16	17	19	20	21	23	24	25	27
26	6	7	8	10	11	12	14	15	17	18	19	21	22	24	25	26	28
27	6	7	9	10	12	13	14	16	17	19	20	22	23	24	26	27	29
28	6	7	9	10	12	13	15	16	18	19	21	22	24	25	27	28	30
29	6	8	9	11	12	14	15	17	19	20	22	23	25	26	28	29	31
30	6	8	10	11	13	14	16	18	19	21	22	24	26	27	29	30	32
9 x 10	2	3	4	4	5	5	6	7	7	8	8	9	10	10	11	11	12
11	3	3	4	5	5	6	7	7	8	9	9	10	11	11	12	13	13
12	3	4	4	5	6	6	7	8	9	9	10	11	12	12	13	14	14
13	3	4	5	5	6	7	8	9	9	10	11	12	12	13	14	15	16
14	3	4	5	6	7	8	8	9	10	11	12	13	13	14	15	16	17
15	4	4	5	6	7	8	9	10	11	12	13	14	14	15	16	17	18
16	4	5	6	7	8	9	10	11	12	12	13	14	15	16	17	18	19
17	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
18	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	21	22
19	5	6	7	8	9	10	11	13	14	15	16	17	18	19	21	22	23
20	5	6	7	8	10	11	12	13	14	16	17	18	19	20	22	23	24
21	5	6	8	9	10	11	13	14	15	16	18	19	20	21	23	24	25
22	5	7	8	9	11	12	13	15	16	17	18	20	21	22	24	25	26
23	6	7	8	10	11	12	14	15	17	18	19	21	22	23	25	26	28
24	6	7	9	10	12	13	14	16	17	19	20	22	23	24	26	27	29

TABLE 3.—*Deduction for rectangular defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet															
	21	22	23	24	25	26	27	28	29	30	31	32	34	36	38	40
	Contents—board feet in tens															
7 x 8	8	8	9	9	9	10	10	10	11	11	12	12	13	13	14	15
9	9	9	10	10	10	11	11	12	12	13	13	13	14	15	16	17
10	10	10	11	11	12	12	13	13	14	14	14	15	16	17	18	19
11	11	11	12	12	13	13	14	14	15	15	16	16	17	18	20	21
12	12	12	13	13	14	15	15	16	16	17	17	18	19	20	21	22
13	13	13	14	15	15	16	16	17	18	18	19	19	21	22	23	24
14	14	14	15	16	16	17	18	18	19	20	20	21	22	24	25	26
15	15	15	16	17	18	18	19	20	20	21	22	22	24	25	27	28
16	16	16	17	18	19	19	20	21	22	22	23	24	25	27	28	30
17	17	17	18	19	20	21	21	22	23	24	25	25	27	29	30	32
18	18	18	19	20	21	22	23	24	24	25	26	27	29	30	32	34
19	19	20	20	21	22	23	24	25	26	27	27	28	30	32	34	35
20	20	21	21	22	23	24	25	26	27	28	29	30	32	34	35	37
21	21	22	23	24	24	25	26	27	28	29	30	31	33	35	37	39
22	22	23	24	25	26	27	28	29	30	31	32	33	35	37	39	41
23	23	24	25	26	27	28	29	30	31	32	33	34	36	39	41	43
24	24	25	26	27	28	29	30	31	32	34	35	36	38	40	43	45
8 x 9	10	11	11	12	12	12	13	13	14	14	15	15	16	17	18	19
10	11	12	12	13	13	14	14	15	15	16	17	17	18	19	20	21
11	12	13	13	14	15	15	16	16	17	18	18	19	20	21	22	23
12	13	14	15	15	16	17	17	18	19	19	20	20	22	23	24	26
13	15	15	16	17	17	18	19	19	20	21	21	22	24	25	26	28
14	16	16	17	18	19	19	20	21	22	22	23	24	25	27	28	30
15	17	18	18	19	20	21	22	22	23	24	25	26	27	29	30	32
16	18	19	20	20	21	22	23	24	25	26	26	27	29	31	32	34
17	19	20	21	22	23	24	24	25	26	27	28	29	31	33	34	36
18	20	21	22	23	24	25	26	27	28	29	30	31	33	35	36	38
19	21	22	23	24	25	26	27	28	29	30	31	32	34	36	39	41
20	22	23	25	26	27	28	29	30	31	32	33	34	36	38	41	43
21	24	25	26	27	28	29	30	31	32	34	35	36	38	40	43	45
22	25	26	27	28	29	31	32	33	34	35	36	38	40	41	45	47
23	26	27	28	29	31	32	33	34	36	37	38	39	42	44	47	49
24	27	28	29	31	32	33	35	36	37	38	40	41	44	46	49	51
25	28	29	31	32	33	35	36	37	39	40	41	43	45	48	51	53
26	29	31	32	33	35	36	37	39	40	42	43	44	47	50	53	55
27	30	32	33	35	36	37	39	40	42	43	45	46	49	52	55	58
28	31	33	34	36	37	39	40	42	43	45	46	48	51	54	57	60
29	32	34	36	37	39	40	42	43	45	46	48	49	53	56	59	62
30	34	35	37	38	40	42	43	45	46	48	50	51	54	58	61	64
9 x 10	13	13	14	14	15	16	16	17	17	18	19	19	20	22	23	24
11	14	15	15	16	16	17	18	18	19	20	20	21	22	24	25	26
12	15	16	17	17	18	19	19	20	21	22	22	23	24	26	27	29
13	16	17	18	19	20	20	21	22	23	23	24	25	27	28	30	31
14	18	18	19	20	21	22	23	24	24	25	26	27	29	30	32	34
15	19	20	21	22	22	23	24	25	26	27	28	29	31	32	34	36
16	20	21	22	23	24	25	26	27	28	29	30	31	33	35	36	38
17	21	22	23	24	26	27	28	29	30	31	32	33	35	37	39	41
18	23	24	25	26	27	28	29	30	31	32	33	35	37	39	41	43
19	24	25	26	27	28	30	31	32	33	34	35	36	39	41	43	46
20	25	26	28	29	30	31	32	34	35	36	37	38	41	43	46	48
21	26	28	29	30	32	33	34	35	37	38	39	40	43	45	48	50
22	28	29	30	32	33	34	36	37	38	40	41	42	45	48	50	53
23	29	30	32	33	34	36	37	39	40	41	43	44	47	50	52	55
24	30	32	33	35	36	37	39	40	42	43	45	46	49	52	55	58

TABLE 3.—*Deduction for rectangular defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet																
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Contents—board feet in tens																
9 x 25	6	8	9	10	12	14	15	16	18	20	21	22	24	26	27	28	30
26	6	8	9	11	12	14	16	17	19	20	22	23	25	27	28	30	31
27	6	8	10	11	13	15	16	18	19	21	23	24	26	28	29	31	32
28	7	8	10	12	13	15	17	18	20	22	24	25	27	29	30	32	34
29	7	9	10	12	14	16	17	19	21	23	24	26	28	30	31	33	35
30	7	9	11	13	14	16	18	20	22	23	25	27	29	31	32	34	36
10 x 11	3	4	4	5	6	7	7	8	9	10	10	11	12	12	13	14	15
12	3	4	5	6	6	7	8	9	10	10	11	12	13	14	14	15	16
13	3	4	5	6	7	8	9	10	10	11	12	13	14	15	16	16	17
14	4	5	6	7	7	8	9	10	11	12	13	14	15	16	17	18	19
15	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
16	4	5	6	7	9	10	11	12	13	14	15	16	17	18	19	20	21
17	5	6	7	8	9	10	11	12	14	15	16	17	18	19	20	22	23
18	5	6	7	8	10	11	12	13	14	16	17	18	19	20	22	23	24
19	5	6	8	9	10	11	13	14	15	16	18	19	20	22	23	24	25
20	5	7	8	9	11	12	13	15	16	17	19	20	21	23	24	25	27
21	6	7	8	10	11	13	14	15	17	18	20	21	22	24	25	27	28
22	6	7	9	10	12	13	15	16	18	19	21	22	23	25	26	28	29
23	6	8	9	11	12	14	15	17	18	20	21	23	25	26	28	29	31
24	6	8	10	11	13	14	16	18	19	21	22	24	26	27	29	30	32
25	7	8	10	12	13	15	17	18	20	22	23	25	27	28	30	32	33
26	7	9	10	12	14	16	17	19	21	23	24	26	28	29	31	33	35
27	7	9	11	13	14	16	18	20	22	23	25	27	29	31	32	34	36
28	7	9	11	13	15	17	19	21	22	24	26	28	30	32	34	35	37
29	8	10	12	14	15	17	19	21	23	25	27	29	31	33	35	37	39
30	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
11 x 12	4	4	5	6	7	8	9	10	11	11	12	13	14	15	16	17	18
13	4	5	6	7	8	9	10	10	11	12	13	14	15	16	17	18	19
14	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	21
15	4	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22
16	5	6	7	8	9	11	12	13	14	15	16	18	19	20	21	22	23
17	5	6	7	9	10	11	12	14	15	16	17	19	20	21	22	24	25
18	5	7	8	9	11	12	13	14	15	16	17	18	20	21	22	24	25	26
19	6	7	8	10	11	13	14	15	17	18	20	21	22	24	25	26	28
20	6	7	9	10	12	13	15	16	18	19	21	22	23	25	26	28	29
21	6	8	9	11	12	14	15	17	18	20	22	23	25	26	28	29	31
22	6	8	10	11	13	15	16	18	19	21	23	24	26	27	29	31	32
23	7	8	10	12	13	15	17	19	20	22	24	25	27	29	30	32	34
24	7	9	11	12	14	16	18	19	21	23	25	26	28	30	32	33	35
25	7	9	11	13	15	16	18	20	22	24	26	28	29	31	33	35	37
26	8	10	11	13	15	17	19	21	23	25	27	29	31	32	34	36	38
27	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
28	8	10	12	14	16	18	21	23	25	27	29	31	33	35	37	39	41
29	9	11	13	15	17	19	21	23	26	28	30	32	34	36	38	40	43
30	9	11	13	15	18	20	22	24	26	29	31	33	35	37	40	42	44
12 x 13	4	5	6	7	8	9	10	11	12	14	15	16	17	18	19	20	21
14	4	6	7	8	9	10	11	12	13	15	16	17	18	19	20	21	22
15	5	6	7	8	10	11	12	13	14	16	17	18	19	20	22	23	24
16	5	6	8	9	10	12	13	14	15	17	18	19	20	22	23	24	26
17	5	7	8	10	11	12	14	15	16	18	19	20	22	23	24	26	27
18	6	7	9	10	12	13	14	16	17	19	20	22	23	24	26	27	29
19	6	8	9	11	12	14	15	17	18	20	21	23	24	26	27	29	30
20	6	8	10	11	13	14	16	18	19	21	22	24	26	27	29	30	32

TABLE 3.—*Deduction for rectangular defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet															
	21	22	23	24	25	26	27	28	29	30	31	32	34	36	38	40
	Contents—board feet in tens															
9 x 25	32	33	34	36	38	39	40	42	44	45	46	48	51	54	57	60
26	33	34	36	37	39	41	42	44	45	47	48	50	53	56	59	62
27	34	36	37	39	40	42	44	45	47	49	50	52	55	58	62	65
28	35	37	39	40	42	44	45	47	49	50	52	54	57	60	64	67
29	37	38	40	42	44	45	47	49	50	52	54	56	59	63	66	70
30	38	40	41	43	45	47	49	50	52	54	56	58	61	65	68	72
10 x 11	15	16	17	18	18	19	20	21	21	22	23	23	25	26	28	29
12	17	18	18	19	20	21	22	22	23	24	25	26	27	29	30	32
13	18	19	20	21	22	23	23	24	25	26	27	28	29	31	33	35
14	20	21	21	22	23	24	25	26	27	28	29	30	32	34	35	37
15	21	22	23	24	25	26	27	28	29	30	31	32	34	36	38	40
16	22	23	25	26	27	28	29	30	31	32	33	34	36	38	41	43
17	24	25	26	27	28	29	31	32	33	34	35	36	39	41	43	45
18	25	26	28	29	30	31	32	34	35	36	37	38	41	43	46	48
19	27	28	29	30	32	33	34	35	37	38	39	41	43	46	48	51
20	28	29	31	32	33	35	36	37	39	40	41	43	45	48	51	53
21	29	31	32	34	35	36	38	39	41	42	43	45	48	50	53	56
22	31	32	34	35	37	38	40	41	43	44	45	47	50	53	56	59
23	32	34	35	37	38	40	41	43	44	46	48	49	52	55	58	61
24	34	35	37	38	40	42	43	45	46	48	50	51	54	58	61	64
25	35	37	38	40	42	43	45	47	48	50	52	53	57	60	63	67
26	36	38	40	42	43	45	47	49	50	52	54	55	59	62	66	69
27	38	40	41	43	45	47	49	50	52	54	56	58	61	65	68	72
28	39	41	43	45	47	49	50	52	54	56	58	60	63	67	71	75
29	41	43	44	46	48	50	52	54	56	58	60	62	66	70	73	77
30	42	44	46	48	50	52	54	56	58	60	62	64	68	72	76	80
11 x 12	18	19	20	21	22	23	24	25	26	26	27	28	30	32	33	35
13	20	21	22	23	24	25	26	27	28	29	30	31	32	34	36	38
14	22	23	24	25	26	27	28	29	30	31	32	33	35	37	39	41
15	23	24	25	26	28	29	30	31	32	33	34	35	37	40	42	44
16	25	26	27	28	29	31	32	33	34	35	36	38	40	42	45	47
17	26	27	29	30	31	32	34	35	36	37	39	40	42	45	47	50
18	28	29	30	32	33	34	36	37	38	40	41	42	45	48	50	53
19	29	31	32	33	35	36	38	39	40	42	43	45	47	50	53	56
20	31	32	34	35	37	38	40	41	43	44	45	47	50	53	56	59
21	32	34	35	37	38	40	42	43	45	46	48	49	52	55	59	62
22	34	35	37	39	40	42	44	45	47	48	50	52	55	58	61	65
23	35	37	39	40	42	44	46	47	49	51	52	54	57	61	64	67
24	37	39	40	42	44	46	48	49	51	53	55	56	60	63	67	70
25	38	40	42	44	46	48	50	51	53	55	57	59	62	66	70	73
26	40	42	44	46	48	50	51	53	55	57	59	61	65	69	72	76
27	42	44	46	48	50	51	53	55	57	59	61	63	67	71	75	79
28	43	45	47	49	51	53	55	57	60	62	64	66	70	74	78	82
29	45	47	49	51	53	55	57	60	62	64	66	68	72	77	81	85
30	46	48	51	53	55	57	59	62	64	66	68	70	75	79	84	88
12 x 13	22	23	24	25	26	27	28	29	30	31	32	33	35	37	40	42
14	24	25	26	27	28	29	30	31	32	34	35	36	38	40	43	45
15	25	26	28	29	30	31	32	34	35	36	37	38	41	43	46	48
16	27	28	29	31	32	33	35	36	37	38	40	41	44	46	49	51
17	29	30	31	33	34	35	37	38	39	41	42	44	46	49	52	54
18	30	32	33	35	36	37	39	40	42	43	45	46	49	52	55	58
19	32	33	35	36	38	40	41	43	44	46	47	49	52	55	58	61
20	34	35	37	38	40	42	43	45	46	48	50	51	54	58	61	64

ABLE 3.—*Deduction for rectangular defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet																
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Contents—board feet in tens																
21	7	8	10	12	13	15	17	18	20	22	24	25	27	29	30	32	34
22	7	9	11	12	14	16	18	19	21	23	25	26	28	30	32	33	35
23	7	9	11	13	15	17	18	20	22	24	26	28	29	31	33	35	37
24	8	10	12	13	15	17	19	21	23	25	27	29	31	33	35	36	38
25	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
26	8	10	12	15	17	19	21	23	25	27	29	31	33	35	37	40	42
27	9	11	13	15	17	19	22	24	26	28	30	32	35	37	39	41	43
28	9	11	13	16	18	20	22	25	27	29	31	34	36	38	40	43	45
29	9	12	14	16	19	21	23	26	28	30	32	35	37	39	42	44	46
30	10	12	14	17	19	22	24	26	29	31	34	36	38	41	43	46	48
14	5	6	7	8	10	11	12	13	15	16	17	18	19	21	22	23	24
15	5	6	8	9	10	12	13	14	16	17	18	20	21	22	23	25	26
16	6	7	8	10	11	12	14	15	17	18	19	21	22	24	25	26	28
17	6	7	9	10	12	13	15	16	18	19	21	22	24	25	27	28	29
18	6	8	9	11	12	14	16	17	19	20	22	23	25	27	28	30	31
19	7	8	10	12	13	15	16	18	20	21	23	25	26	28	30	31	33
20	7	9	10	12	14	16	17	19	21	23	24	26	28	29	31	33	35
21	7	9	11	13	15	16	18	20	22	24	25	27	29	31	33	35	36
22	8	10	11	13	15	17	19	21	23	25	27	29	31	32	34	36	38
23	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
24	8	10	12	15	17	19	21	23	25	27	29	31	33	35	37	40	42
25	9	11	13	15	17	20	22	24	26	28	30	32	35	37	39	41	43
26	9	11	14	16	18	20	23	25	27	29	32	34	36	38	41	43	45
27	9	12	14	16	19	21	23	26	28	30	33	35	37	40	42	44	47
28	10	12	15	17	19	22	24	27	29	32	34	36	39	41	44	46	49
29	10	13	15	18	20	23	25	28	30	33	35	38	40	43	45	48	50
30	10	13	16	18	21	23	26	29	31	34	36	39	42	44	47	49	52
15	6	7	8	10	11	13	14	15	17	18	20	21	22	24	25	27	28
16	6	7	9	10	12	13	15	16	18	19	21	22	24	25	27	28	30
17	6	8	10	11	13	14	16	17	19	21	22	24	25	27	29	30	32
18	7	8	10	12	13	15	17	18	20	22	24	25	27	29	30	32	34
19	7	9	11	12	14	16	18	20	21	23	25	27	28	30	32	34	35
20	7	9	11	13	15	17	19	21	22	24	26	28	30	32	34	35	37
21	8	10	12	14	16	18	20	22	24	25	27	29	31	33	35	37	39
22	8	10	12	14	16	18	21	23	25	27	29	31	33	35	37	39	41
23	9	11	13	15	17	19	21	24	26	28	30	32	34	36	39	41	43
24	9	11	13	16	18	20	22	25	27	29	31	34	36	38	40	43	45
25	9	12	14	16	19	21	23	26	28	30	33	35	37	40	42	44	47
26	10	12	15	17	19	22	24	27	29	32	34	36	39	41	44	46	49
27	10	13	15	18	20	23	25	28	30	33	35	38	40	43	45	48	50
28	10	13	16	18	21	24	26	29	31	34	37	39	42	44	47	50	52
29	11	14	16	19	22	24	27	30	32	35	38	41	43	46	49	51	54
30	11	14	17	20	22	25	28	31	34	36	39	42	45	48	50	53	56
16	6	8	10	11	13	14	16	18	19	21	22	24	26	27	29	30	32
17	7	8	10	12	14	15	17	19	20	22	24	26	27	29	31	32	34
18	7	9	11	13	14	16	18	20	22	23	25	27	29	31	32	34	36
19	8	10	11	13	15	17	19	21	23	25	27	28	30	32	34	36	38
20	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
21	8	10	13	15	17	19	21	23	25	27	29	32	34	36	38	40	42
22	9	11	13	15	18	20	22	24	26	29	31	33	35	37	40	42	44
23	9	12	14	16	18	21	23	25	28	30	32	34	37	39	41	44	46
24	10	12	14	17	19	22	24	26	29	31	34	36	38	41	43	46	48
25	10	12	15	18	20	22	25	28	30	32	35	38	40	42	45	48	50

TABLE 3.—*Deduction for rectangular defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet															
	21	22	23	24	25	26	27	28	29	30	31	32	34	36	38	40
	Contents—board feet in tens															
12 x 21	35	37	39	40	42	44	45	47	49	50	52	54	57	60	64	67
22	37	39	40	42	44	46	48	49	51	53	55	56	60	63	67	70
23	39	40	42	44	46	48	50	52	53	55	57	59	63	66	70	74
24	40	42	44	46	48	50	52	54	56	58	60	61	65	69	73	77
25	42	44	46	48	50	52	54	56	58	60	62	64	68	72	76	80
26	44	46	48	50	52	54	56	58	60	62	64	67	71	75	79	83
27	45	48	50	52	54	56	58	60	63	65	67	69	73	78	82	86
28	47	49	52	54	56	58	60	63	65	67	69	72	76	81	85	90
29	49	51	53	56	58	60	63	65	67	70	72	74	79	84	88	93
30	50	53	55	58	60	62	65	67	70	72	74	77	82	86	91	96
13 x 14	25	27	28	29	30	32	33	34	35	36	38	39	41	44	46	49
15	27	29	30	31	32	34	35	36	38	39	40	42	44	47	49	52
16	29	31	32	33	35	36	37	39	40	42	43	44	47	50	53	55
17	31	32	34	35	37	38	40	41	43	44	46	47	50	53	56	59
18	33	34	36	37	39	41	42	44	45	47	48	50	53	56	59	62
19	35	36	38	40	41	43	44	46	48	49	51	53	56	59	63	66
20	36	38	40	42	43	45	47	49	50	52	54	55	59	62	66	69
21	38	40	42	44	46	47	49	51	53	55	56	58	62	66	69	73
22	40	42	44	46	48	50	51	53	55	57	59	61	65	69	72	76
23	42	44	46	48	50	52	54	56	58	60	62	64	68	72	76	80
24	44	46	48	50	52	54	56	58	60	62	64	67	71	75	79	83
25	46	48	50	52	54	56	58	61	63	65	67	69	74	78	82	87
26	47	50	52	54	56	59	61	63	65	68	70	72	77	81	86	90
27	49	51	54	56	58	61	63	66	68	70	73	75	80	84	89	94
28	51	53	56	58	61	63	66	68	70	73	75	78	83	87	92	97
29	53	55	58	60	63	65	68	70	73	75	78	80	85	90	96	101
30	55	57	60	62	65	68	70	73	75	78	81	83	88	94	99	104
14 x 15	29 31	31	32	34	35	36	38	39	41	42	43	45	48	50	53	56
16	33	33	34	36	37	39	40	42	43	45	46	48	51	54	57	60
17	35	35	36	38	40	41	43	44	46	48	49	51	54	57	60	63
18	37	37	39	40	42	44	45	47	49	50	52	54	57	60	64	67
19	39	39	41	43	44	46	48	50	51	53	55	57	60	64	67	71
20	41	41	43	45	47	49	50	52	54	56	58	60	63	67	71	75
21	43	43	45	47	49	51	53	55	57	59	61	63	67	71	74	78
22	45	45	47	49	51	53	55	57	60	62	64	66	70	74	78	82
23	47	47	49	52	54	56	58	60	62	64	67	69	73	77	82	86
24	49	49	52	54	56	58	60	63	65	67	69	72	76	81	85	90
25	51	51	54	56	58	61	63	65	68	70	72	75	79	84	89	93
26	53	53	56	58	61	63	66	68	70	73	75	78	83	87	92	97
27		55	58	60	63	66	68	71	73	76	78	81	86	91	96	101
28	55	57	60	63	65	68	71	73	76	78	81	84	89	94	99	105
29	57	60	62	65	68	70	73	76	78	81	84	87	92	97	103	108
30	59	62	64	67	70	73	76	78	81	84	87	90	95	101	106	112
15 x 16	34	35	37	38	40	42	43	45	46	48	50	51	54	58	61	64
17	36	37	39	41	42	44	46	48	49	51	53	54	58	61	65	68
18	38	40	41	43	45	47	49	50	52	54	56	58	61	65	68	72
19	40	42	44	46	48	49	51	53	55	57	59	61	65	68	72	76
20	42	44	46	48	50	52	54	56	58	60	62	64	68	72	76	80
21	44	46	48	50	52	55	57	59	61	63	65	67	71	76	80	84
22	46	48	51	53	55	57	59	62	64	66	68	70	75	79	84	88
23	48	51	53	55	58	60	62	64	67	69	71	74	78	83	87	92
24	50	53	55	58	60	62	65	67	70	72	74	77	82	86	91	96
25	52	55	58	60	62	65	68	70	72	75	78	80	85	90	95	100

TABLE 3.—*Deduction for rectangular defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet																
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Contents—board feet in tens																
15 x 26	10	13	16	18	21	23	26	29	31	34	36	39	42	44	47	49	52
27	11	14	16	19	22	24	27	30	32	35	38	40	43	46	49	51	54
28	11	14	17	20	22	25	28	31	34	36	39	42	45	48	50	53	56
29	12	14	17	20	23	26	29	32	35	38	41	44	46	49	52	55	58
30	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
16 x 17	7	9	11	13	15	16	18	20	22	24	25	27	29	31	33	34	36
18	8	10	12	13	15	17	19	21	23	25	27	29	31	33	35	36	38
19	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	39	41
20	9	11	13	15	17	19	21	23	26	28	30	32	34	36	38	41	43
21	9	11	13	16	18	20	22	25	27	29	31	34	36	38	40	43	45
22	9	12	14	16	19	21	23	26	28	31	33	35	38	40	42	45	47
23	10	12	15	17	20	22	25	27	29	32	34	37	39	42	44	47	49
24	10	13	15	18	20	23	26	28	31	33	36	38	41	44	46	49	51
25	11	13	16	19	21	24	27	29	32	35	37	40	43	45	48	51	53
26	11	14	17	19	22	25	28	31	33	36	39	42	44	47	50	53	55
27	12	14	17	20	23	26	29	32	35	37	40	43	46	49	52	55	58
28	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
29	12	15	19	22	25	28	31	34	37	40	43	46	49	53	56	59	62
30	13	16	19	22	26	29	32	35	38	42	45	48	51	54	58	61	64
17 x 18	8	10	12	14	16	18	20	22	24	27	29	31	33	35	37	39	41
19	9	11	13	15	17	19	22	24	26	28	30	32	34	37	39	41	43
20	9	11	14	16	18	20	23	25	27	29	32	34	36	39	41	43	45
21	10	12	14	17	19	21	24	26	29	31	33	36	38	40	43	45	48
22	10	12	15	17	20	22	25	27	30	32	35	37	40	42	45	47	50
23	10	13	16	18	21	23	26	29	31	34	36	39	42	44	47	50	52
24	11	14	16	19	22	24	27	30	33	35	38	41	44	46	49	52	54
25	11	14	17	20	23	26	28	31	34	37	40	42	45	48	51	54	57
26	12	15	18	21	24	27	29	32	35	38	41	44	47	50	53	56	59
27	12	15	18	21	24	28	31	34	37	40	43	46	49	52	55	58	61
28	13	16	19	22	25	29	32	35	38	41	44	48	51	54	57	60	63
29	13	16	20	23	26	30	33	36	39	43	46	49	53	56	59	62	66
30	14	17	20	24	27	31	34	37	41	44	48	51	54	58	61	65	68
18 x 19	9	11	14	16	18	21	23	25	27	30	32	34	36	39	41	43	46
20	10	12	14	17	19	22	24	26	29	31	34	36	38	41	43	46	48
21	10	13	15	18	20	23	25	28	30	33	35	38	40	43	45	48	50
22	11	13	16	18	21	24	26	29	32	34	37	40	42	45	48	50	53
23	11	14	17	19	22	25	28	30	33	36	39	41	44	47	50	52	55
24	12	14	17	20	23	26	29	32	35	37	40	43	46	49	52	55	58
25	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
26	12	16	19	22	25	28	31	34	37	41	44	47	50	53	56	59	62
27	13	16	19	23	26	29	32	36	39	42	45	49	52	55	58	62	65
28	13	17	20	24	27	30	34	37	40	44	47	50	54	57	60	64	67
29	14	17	21	24	28	31	35	38	42	45	49	52	56	59	63	66	70
30	14	18	22	25	29	32	36	40	43	47	50	54	58	61	65	68	72
19 x 20	10	13	15	18	20	23	25	28	30	33	35	38	41	43	46	48	51
21	11	13	16	19	21	24	27	29	32	35	37	40	43	45	48	51	53
22	11	14	17	20	22	25	28	31	33	36	39	42	45	47	50	53	56
23	12	15	17	20	23	26	29	32	35	38	41	44	47	50	52	55	58
24	12	15	18	21	24	27	30	33	36	40	43	46	49	52	55	58	61
25	13	16	19	22	25	28	32	35	38	41	44	48	51	54	57	60	63
26	13	16	20	23	26	30	33	36	40	43	46	49	53	56	59	63	66
27	14	17	21	24	27	31	34	38	41	44	48	51	55	58	62	65	68

TABLE 3.—*Deduction for rectangular defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet															
	21	22	23	24	25	26	27	28	29	30	31	32	34	36	38	40
	Contents—board feet in tens															
15 x 26	55	57	60	62	65	68	70	73	75	78	81	83	88	94	99	104
27	57	59	62	65	68	70	73	76	78	81	84	86	92	97	103	108
28	59	62	64	67	70	73	76	78	81	84	87	90	95	101	106	112
29	61	64	67	70	72	75	78	81	84	87	90	93	99	104	110	116
30	63	66	69	72	75	78	81	84	87	90	93	96	102	108	114	120
16 x 17	38	40	42	44	45	47	49	51	53	54	56	58	62	65	69	73
18	40	42	44	46	48	50	52	54	56	58	60	61	65	69	73	77
19	43	45	47	49	51	53	55	57	59	61	63	65	69	73	77	81
20	45	47	49	51	53	55	58	60	62	64	66	68	73	77	81	85
21	47	49	52	54	56	58	60	63	65	67	69	72	76	81	85	90
22	49	52	54	56	59	61	63	66	68	70	73	75	80	84	89	94
23	52	54	56	59	61	64	66	69	71	74	76	79	83	88	93	98
24	54	56	59	61	64	67	69	72	74	77	79	82	87	92	97	102
25	56	59	61	64	67	69	72	75	77	80	83	85	91	96	101	107
26	58	61	64	67	69	72	75	78	80	83	86	89	94	100	105	111
27	60	63	66	69	72	75	78	81	84	86	89	92	98	104	109	115
28	63	66	69	72	75	78	81	84	87	90	93	96	102	108	113	119
29	65	68	71	74	77	80	84	87	90	93	96	99	105	111	118	124
30	67	70	74	77	80	83	86	90	93	96	99	102	109	115	122	128
17 x 18	43	45	47	49	51	53	55	57	59	61	63	65	69	73	78	82
19	45	47	50	52	54	56	58	60	62	65	67	69	73	78	82	86
20	48	50	52	54	57	59	61	63	66	68	70	73	77	82	86	91
21	50	52	55	57	60	62	64	67	69	71	74	76	81	86	90	95
22	52	55	57	60	62	65	67	70	72	75	77	80	85	90	95	100
23	55	57	60	63	65	68	70	73	76	78	81	83	89	94	99	104
24	57	60	63	65	68	71	73	76	79	82	84	87	92	98	103	109
25	60	62	65	68	71	74	76	79	82	85	88	91	96	102	108	113
26	62	65	68	71	74	77	80	83	85	88	91	94	100	106	112	118
27	64	67	70	73	76	80	83	86	89	92	95	98	104	110	116	122
28	67	70	73	76	79	83	86	89	92	95	98	102	108	114	121	127
29	69	72	76	79	82	85	89	92	95	99	102	105	112	118	125	131
30	71	75	78	82	85	88	92	95	99	102	105	109	116	122	129	136
18 x 19	48	50	52	55	57	59	62	64	66	68	71	73	78	82	87	91
20	50	53	55	58	60	62	65	67	70	72	74	77	82	86	91	96
21	53	55	58	60	63	66	68	71	73	76	78	81	86	91	96	101
22	55	58	61	63	66	69	71	74	77	79	82	84	90	95	100	106
23	58	61	63	66	69	72	75	77	80	83	86	88	94	99	105	110
24	60	63	66	69	72	75	78	81	84	86	89	92	98	104	109	115
25	63	66	69	72	75	78	81	84	87	90	93	96	102	108	114	120
26	66	69	72	75	78	81	84	87	90	94	97	100	106	112	119	125
27	68	71	75	78	81	84	87	91	94	97	100	104	110	117	123	130
28	71	74	77	81	84	87	91	94	97	101	104	108	114	121	128	134
29	73	77	80	84	87	90	94	97	101	104	108	111	118	125	132	139
30	76	79	83	86	90	94	97	101	104	108	112	115	122	130	137	144
19 x 20	53	56	58	61	63	66	68	71	73	76	79	81	86	91	96	101
21	56	59	61	64	66	69	72	74	77	80	82	85	90	96	101	106
22	59	61	64	67	70	72	75	78	81	84	86	89	95	100	106	111
23	61	64	67	70	73	76	79	82	84	87	90	93	99	105	111	117
24	64	67	70	73	76	79	82	85	88	91	94	97	103	109	116	122
25	66	70	73	76	79	82	86	89	92	95	98	101	108	114	120	127
26	69	72	76	79	82	86	89	92	96	99	102	105	112	119	125	132
27	72	75	79	82	86	89	92	96	99	103	106	109	116	123	130	137

TABLE 3.—*Deduction for rectangular defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet																
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Contents—board feet in tens																
19 x 28	14	18	21	25	28	32	35	39	43	46	50	53	57	60	64	67	71
29	15	18	22	26	29	33	37	40	44	48	51	55	59	62	66	70	73
30	15	19	23	27	30	34	38	42	46	49	53	57	61	65	68	72	76
20 x 21	11	14	17	20	22	25	28	31	34	36	39	42	45	48	50	53	56
22	12	15	18	21	23	26	29	32	35	38	41	44	47	50	53	56	59
23	12	15	18	21	25	28	31	34	37	40	43	46	49	52	55	58	61
24	13	16	19	22	26	29	32	35	38	42	45	48	51	54	58	61	64
25	13	17	20	23	27	30	33	37	40	43	47	50	53	57	60	63	67
26	14	17	21	24	28	31	35	38	42	45	49	52	55	59	62	66	69
27	14	18	22	25	29	32	36	40	43	47	50	54	58	61	65	68	72
28	15	19	22	26	30	34	37	41	45	49	52	56	60	63	67	71	75
29	15	19	23	27	31	35	39	43	46	50	54	58	62	66	70	73	77
30	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
21 x 22	12	15	18	22	25	28	31	34	37	40	43	46	49	52	55	59	62
23	13	16	19	23	26	29	32	35	39	42	45	48	52	55	58	61	64
24	13	17	20	24	27	30	34	37	40	44	47	50	54	57	60	64	67
25	14	18	21	24	28	32	35	38	42	46	49	52	56	60	63	66	70
26	15	18	22	25	29	33	36	40	44	47	51	55	58	62	66	69	73
27	15	19	23	26	30	34	38	42	45	49	53	57	60	64	68	72	76
28	16	20	24	27	31	35	39	43	47	51	55	59	63	67	71	74	78
29	16	20	24	28	32	37	41	45	49	53	57	61	65	69	73	77	81
30	17	21	25	29	34	38	42	46	50	55	59	63	67	71	76	80	84
22 x 23	13	17	20	24	27	30	34	37	40	44	47	51	54	57	61	64	67
24	14	18	21	25	28	32	35	39	42	46	49	53	56	60	63	67	70
25	15	18	22	26	29	33	37	40	44	48	51	55	59	62	66	70	73
26	15	19	23	27	31	34	38	42	46	50	53	57	61	65	69	72	76
27	16	20	24	28	32	36	40	44	48	51	55	59	63	67	71	75	79
28	16	21	25	29	33	37	41	45	49	53	57	62	66	70	74	78	82
29	17	21	26	30	34	38	43	47	51	55	60	64	68	72	77	81	85
30	18	22	26	31	35	40	44	48	53	57	62	66	70	75	79	84	88
23 x 24	15	18	22	26	29	33	37	40	44	48	52	55	59	63	66	70	74
25	15	19	23	27	31	34	38	42	46	50	54	58	61	65	69	73	77
26	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
27	17	21	25	29	33	37	41	46	50	54	58	62	66	70	75	79	83
28	17	21	26	30	34	39	43	47	52	56	60	64	69	73	77	82	86
29	18	22	27	31	36	40	44	49	53	58	62	67	71	76	80	84	89
30	18	23	28	32	37	41	46	51	55	60	64	69	74	78	83	87	92
24 x 25	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
26	17	21	25	29	33	37	42	46	50	54	58	62	67	71	75	79	83
27	17	22	26	30	35	39	43	48	52	56	60	65	69	73	78	82	86
28	18	22	27	31	36	40	45	49	54	58	63	67	72	76	81	85	90
29	19	23	28	32	37	42	46	51	56	60	65	70	74	79	84	88	93
30	19	24	29	34	38	43	48	53	58	62	67	72	77	82	86	91	96
25 x 26	17	22	26	30	35	39	43	48	52	56	61	65	69	74	78	82	87
27	18	22	27	32	36	40	45	50	54	58	63	68	72	76	81	86	90
28	19	23	28	33	37	42	47	51	56	61	65	70	75	79	84	89	93
29	19	24	29	34	39	44	48	53	58	63	68	72	77	82	87	92	97
30	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100

TABLE 3.—*Deduction for rectangular defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet															
	21	22	23	24	25	26	27	28	29	30	31	32	34	36	38	40
	Contents—board feet in tens															
19 x 28	74	78	82	85	89	92	96	99	103	106	110	113	121	128	135	142
29	77	81	84	88	92	96	99	103	107	110	114	118	125	132	140	147
30	80	84	87	91	95	99	103	106	110	114	118	122	129	137	144	152
20 x 21	59	62	64	67	70	73	76	78	81	84	87	90	95	101	106	112
22	62	65	67	70	73	76	79	82	85	88	91	94	100	106	111	117
23	64	67	71	74	77	80	83	86	89	92	95	98	104	110	117	123
24	67	70	74	77	80	83	86	90	93	96	99	102	109	115	122	128
25	70	73	77	80	83	87	90	93	97	100	103	107	113	120	127	133
26	73	76	80	83	87	90	94	97	101	104	107	111	118	125	132	139
27	76	79	83	86	90	94	97	101	104	108	112	115	122	130	137	144
28	78	82	86	90	93	97	101	105	108	112	116	119	127	134	142	149
29	81	85	89	93	97	101	104	108	112	116	120	124	131	139	147	155
30	84	88	92	96	100	104	108	112	116	120	124	128	136	144	152	160
21 x 22	65	68	71	74	77	80	83	86	89	92	95	99	105	111	117	123
23	68	71	74	77	80	84	87	90	93	97	100	103	109	116	122	129
24	71	74	77	81	84	87	91	94	97	101	104	108	114	121	128	134
25	74	77	80	84	88	91	94	98	102	105	108	112	119	126	133	140
26	76	80	84	87	91	95	98	102	106	109	113	116	124	131	138	146
27	79	83	87	91	94	98	102	106	110	113	117	121	129	136	144	151
28	82	86	90	94	98	102	106	110	114	118	122	125	133	141	149	157
29	85	89	93	97	102	106	110	114	118	122	126	130	138	146	154	162
30	88	92	97	101	105	109	113	118	122	126	130	134	143	151	160	168
22 x 23	71	74	78	81	84	88	91	94	98	101	105	108	115	121	128	135
24	74	77	81	84	88	92	95	99	102	106	109	113	120	127	134	141
25	77	81	84	88	92	95	99	103	106	110	114	117	125	132	139	147
26	80	84	88	92	95	99	103	107	111	114	118	122	130	137	145	153
27	83	87	91	95	99	103	107	111	115	119	123	127	135	143	150	158
28	86	90	94	99	103	107	111	115	119	123	127	131	140	148	156	164
29	89	94	98	102	106	111	115	119	123	128	132	136	145	153	162	170
30	92	97	101	106	110	114	119	123	128	132	136	141	150	158	167	176
23 x 24	77	81	85	88	92	96	99	103	107	110	114	118	125	132	140	147
25	80	84	88	92	96	100	104	107	111	115	119	123	130	138	146	153
26	84	88	92	96	100	104	108	112	116	120	124	128	136	144	151	159
27	87	91	95	99	104	108	112	116	120	124	128	132	141	149	157	166
28	90	94	99	103	107	112	116	120	125	129	133	137	146	155	163	172
29	93	98	102	107	111	116	120	125	129	133	138	142	151	160	169	178
30	97	101	106	110	115	120	124	129	133	138	143	147	156	166	175	184
24 x 25	84	88	92	96	100	104	108	112	116	120	124	128	136	144	152	160
26	87	92	96	100	104	108	112	116	121	125	129	133	141	150	158	166
27	91	95	99	104	108	112	117	121	125	130	134	138	147	156	164	173
28	94	99	103	108	112	116	121	125	130	134	139	143	152	161	170	179
29	97	102	107	111	116	121	126	130	135	139	144	148	158	167	176	186
30	101	106	110	115	120	125	130	134	139	144	149	154	163	173	182	192
25 x 26	91	95	100	104	108	113	117	121	126	130	134	139	147	156	165	173
27	94	99	104	108	112	117	122	126	130	135	140	144	153	162	171	180
28	98	103	107	112	117	121	126	131	135	140	145	149	159	168	177	187
29	102	106	111	116	121	126	130	135	140	145	150	155	164	174	184	193
30	105	110	115	120	125	130	135	140	145	150	155	160	170	180	190	200

TABLE 3.—*Deduction for rectangular defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet																
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Contents—board feet in tens																
26 x 27	19	23	28	33	37	42	47	51	56	61	66	70	75	80	84	89	94
28	19	24	29	34	39	44	49	53	58	63	68	73	78	83	87	92	97
29	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	96	101
30	21	26	31	36	42	47	52	57	62	68	73	78	83	88	94	99	104
27 x 28	20	25	30	35	40	45	50	55	60	66	71	76	81	86	91	96	101
29	21	26	31	37	42	47	52	57	63	68	73	78	84	89	94	99	104
30	22	27	32	38	43	49	54	59	65	70	76	81	86	92	97	103	108
28 x 29	22	27	32	38	43	49	54	60	65	70	76	81	87	92	97	103	108
30	22	28	34	39	45	50	56	62	67	73	78	84	90	95	101	106	112
29 x 30	23	29	35	41	46	52	58	64	70	75	81	87	93	99	104	110	116

TABLE 4.—*Deduction for squared defects—Scribner Decimal C log rule*

[20 percent deducted for kerf from solid board-foot contents]

End dimensions, inches	Length of defect—feet								
	4	5	6	7	8	9	10	11	12
	Contents—board feet in tens								
2 x 2							0.5	0.5	0.5
3 x 3		0.5	0.5	0.5	0.5	0.5	.5	.5	.5
4 x 4	0.5	.5	.5	1	1	1	1	1	1
5 x 5	.5	1	1	1	1	2	2	2	2
6 x 6	1	1	1	2	2	2	2	3	3
7 x 7	1	2	2	2	3	3	3	4	4
8 x 8	2	2	3	3	3	4	4	5	5
9 x 9	2	3	3	4	4	5	5	6	6
10 x 10	3	3	4	5	5	6	7	7	8
11 x 11	3	4	5	6	6	7	8	9	10
12 x 12	4	5	6	7	8	9	10	11	12
13 x 13	5	6	7	8	9	10	11	12	14
14 x 14	5	7	8	9	10	12	13	14	16
15 x 15	6	8	9	10	12	14	15	16	18
16 x 16	7	9	10	12	14	15	17	19	20
17 x 17	8	10	12	13	15	17	19	21	23
18 x 18	9	11	13	15	17	19	22	24	26
19 x 19	10	12	14	17	19	22	24	26	29
20 x 20	11	13	16	19	21	24	27	29	32
21 x 21	12	15	18	21	24	26	29	32	35

TABLE 3.—*Deduction for rectangular defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet															
	21	22	23	24	25	26	27	28	29	30	31	32	34	36	38	40
	Contents—board feet in tens															
26 x 27	98	103	108	112	117	122	126	131	136	140	145	150	159	168	178	187
28	102	107	112	116	121	126	131	136	141	146	150	155	165	175	184	194
29	106	111	116	121	126	131	136	141	146	151	156	161	171	181	191	201
30	109	114	120	125	130	135	140	146	151	156	161	166	177	187	198	208
27 x 28	106	111	116	121	126	131	136	141	146	151	156	161	171	181	192	202
29	110	115	120	125	130	136	141	146	151	157	162	167	177	188	198	209
30	113	119	124	130	135	140	146	151	157	162	167	173	184	194	205	216
28 x 29	114	119	125	130	135	141	146	152	157	162	168	173	184	195	206	217
30	118	123	129	134	140	146	151	157	162	168	174	179	190	202	213	224
29 x 30	122	128	133	139	145	151	157	162	168	174	180	186	197	209	220	232

TABLE 4.—*Deduction for squared defects—Scribner Decimal C log rule*

End dimensions, inches	Length of defect—feet							
	13	14	15	16	17	18	19	20
	Contents—board feet in tens							
2 x 2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
3 x 3	1	1	1	1	1	1	1	1
4 x 4	1	1	2	2	2	2	2	2
5 x 5	2	2	2	3	3	3	3	3
6 x 6	3	3	4	4	4	4	5	5
7 x 7	4	5	5	5	6	6	6	7
8 x 8	6	6	6	7	7	8	8	9
9 x 9	7	8	8	9	9	10	10	11
10 x 10	9	9	10	11	11	12	13	13
11 x 11	10	11	12	13	14	15	15	16
12 x 12	12	13	14	15	16	17	18	19
13 x 13	15	16	17	18	19	20	21	23
14 x 14	17	18	20	21	22	24	25	26
15 x 15	20	21	22	24	26	27	28	30
16 x 16	22	24	26	27	29	31	32	34
17 x 17	25	27	29	31	33	35	37	39
18 x 18	28	30	32	35	37	39	41	43
19 x 19	31	34	36	39	41	43	46	48
20 x 20	35	37	40	43	45	48	51	53
21 x 21	38	41	44	47	50	53	56	59

TABLE 4.—*Deduction for squared defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet								
	4	5	6	7	8	9	10	11	12
	Contents—board feet in tens								
22 x 22	13	16	19	23	26	29	32	35	39
23 x 23	14	18	21	25	28	32	35	39	42
24 x 24	15	19	23	27	31	35	38	42	46
25 x 25	17	21	25	29	33	38	42	46	50
26 x 26	18	23	27	32	36	41	45	50	54
27 x 27	19	24	29	34	39	44	49	53	58
28 x 28	21	26	31	37	42	47	52	57	63
29 x 29	22	28	34	39	45	50	56	62	67
30 x 30	24	30	36	42	48	54	60	66	72

TABLE 4.—*Deduction for squared defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet															
	21	22	23	24	25	26	27	28	29	30	31	32	34	36	38	40
	Contents—board feet in tens															
2 x 2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	1	1	1	1	1	1	1	1
3 x 3	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
4 x 4	2	2	2	3	3	3	3	3	3	3	3	3	4	4	4	4
5 x 5	4	4	4	4	4	4	4	5	5	5	5	5	6	6	6	7
6 x 6	5	5	6	6	6	6	6	7	7	7	7	8	8	9	9	10
7 x 7	7	7	8	8	8	8	9	9	9	10	10	10	11	12	12	13
8 x 8	9	9	10	10	11	11	12	12	12	13	13	14	15	15	16	17
9 x 9	11	12	12	13	14	14	15	15	16	16	17	17	18	19	21	22
10 x 10	14	15	15	16	17	17	18	19	19	20	21	21	23	24	25	27
11 x 11	17	18	19	19	20	21	22	23	23	24	25	26	27	29	31	32
12 x 12	20	21	22	23	24	25	26	27	28	29	30	31	33	35	36	38
13 x 13	24	25	26	27	28	29	30	32	33	34	35	36	38	41	43	45
14 x 14	27	29	30	31	33	34	35	37	38	39	41	42	44	47	50	52
15 x 15	32	33	34	36	38	39	40	42	44	45	46	48	51	54	57	60
16 x 16	36	38	39	41	43	44	46	48	49	51	53	55	58	61	65	68

TABLE 4.—*Deduction for squared defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet							
	13	14	15	16	17	18	19	20
	Contents—board feet in tens							
22 x 22	42	45	48	52	55	58	61	65
23 x 23	46	49	53	56	60	63	67	71
24 x 24	50	54	58	61	65	69	73	77
25 x 25	54	58	63	67	71	75	79	83
26 x 26	59	63	68	72	77	81	86	90
27 x 27	63	68	73	78	83	87	92	97
28 x 28	68	73	78	84	89	94	99	105
29 x 29	73	78	84	90	95	101	107	112
30 x 30	78	84	90	96	102	108	114	120

TABLE 4.—*Deduction for squared defects—Scribner Decimal C log rule*—Continued

End dimensions, inches	Length of defect—feet														
	21	22	23	24	25	26	27	28	29	30	31	32	34	36	38	40
	Contents—board feet in tens															
17 x 17	40	42	44	46	48	50	52	54	56	58	60	62	66	69	73	77
18 x 18	45	48	50	52	54	56	58	60	63	65	67	69	73	78	82	86
19 x 19	51	53	55	58	60	63	65	67	70	72	75	77	82	87	91	96
20 x 20	56	59	61	64	67	69	72	75	77	80	83	85	91	96	101	107
21 x 21	62	65	68	71	74	76	79	82	85	88	91	94	100	106	112	118
22 x 22	68	71	74	77	81	84	87	90	94	97	100	103	110	116	123	129
23 x 23	74	78	81	85	88	92	95	99	102	106	109	113	120	127	134	141
24 x 24	81	84	88	92	96	100	104	108	111	115	119	123	131	138	146	154
25 x 25	88	92	96	100	104	108	112	117	121	125	129	133	142	150	158	167
26 x 26	95	99	104	108	113	117	122	126	131	135	140	144	153	162	171	180
27 x 27	102	107	112	117	122	126	131	136	141	146	151	156	165	175	185	194
28 x 28	110	115	120	125	131	136	141	146	152	157	162	167	178	188	199	209
29 x 29	118	123	129	135	140	146	151	157	163	168	174	179	191	202	213	224
30 x 30	126	132	138	144	150	156	162	168	174	180	186	192	204	216	228	240

TABLE 5.—*International ¼ inch log rule*[1]

4- TO 12-FOOT LOGS

Diameter, inches	Length—feet								
	4	5	6	7	8	9	10	11	12
	Volume—board feet								
5			5	5	5	5	5	5	10
6	5	5	5	5	10	10	10	10	15
7	5	5	10	10	10	15	15	15	20
8	10	10	10	15	15	20	20	25	25
9	10	15	15	20	20	25	30	30	35
10	15	15	20	25	30	35	35	40	45
11	15	20	25	30	35	40	45	50	55
12	20	25	30	40	45	50	55	65	70
13	25	30	40	45	55	60	70	75	85
14	30	40	45	55	65	70	80	90	100
15	35	45	55	65	75	85	95	105	115
16	40	50	60	75	85	95	110	120	130
17	45	60	70	85	95	110	125	135	150
18	55	65	80	95	110	125	140	155	170
19	60	75	90	105	125	140	155	175	190
20	65	85	100	120	135	155	175	195	210
21	75	95	115	135	155	175	195	215	235
22	80	105	125	145	170	190	215	235	260
23	90	115	140	160	185	210	235	260	285
24	100	125	150	175	205	230	255	285	310
25	110	135	165	195	220	250	280	310	340
26	120	150	180	210	240	275	305	335	370
27	130	160	195	225	260	295	330	365	400
28	140	175	210	245	280	320	355	395	430
29	150	185	225	265	305	345	385	425	465
30	160	200	245	285	325	370	410	455	495
31	170	215	260	305	350	395	440	485	530
32	185	230	280	325	375	420	470	520	570
33	195	245	295	345	400	450	500	555	605
34	210	260	315	370	425	480	535	590	645
35	220	280	335	390	450	510	565	625	685
36	235	295	355	415	475	540	600	665	725
37	250	315	375	440	505	570	635	700	770
38	265	330	400	465	535	605	670	740	810
39	280	350	420	490	565	635	710	785	855
40	295	370	445	520	595	670	750	825	900
41	310	385	465	545	625	705	785	870	950
42	325	405	490	575	655	740	825	910	995
43	340	430	515	600	690	780	870	955	1,045
44	355	450	540	630	725	815	910	1,005	1,095
45	375	470	565	660	755	855	955	1,050	1,150

[1] Values as published by H. H. Chapman, extended by formula: $V=(0.22\ D^2-0.71D) \times .905$ for 4-foot section. Taper allowance: ½ inch per 4 feet lineal.

TABLE 5.—*International ¼ inch log rule*

13- TO 20-FOOT LOGS

Diameter, inches	Length—feet							
	13	14	15	16	17	18	19	20
	Volume—board feet							
5	10	10	10	10	15	15	15	15
6	15	15	20	20	20	25	25	25
7	20	25	25	30	30	35	35	40
8	30	35	35	40	40	45	50	50
9	40	45	45	50	55	60	65	70
10	50	55	60	65	70	75	80	85
11	65	70	75	80	85	95	100	105
12	75	85	90	95	105	110	120	125
13	90	100	105	115	125	135	140	150
14	105	115	125	135	145	155	165	175
15	125	135	145	160	170	180	195	205
16	145	155	170	180	195	205	220	235
17	165	180	190	205	220	235	250	265
18	185	200	215	230	250	265	280	300
19	205	225	245	260	280	300	315	335
20	230	250	270	290	310	330	350	370
21	255	280	300	320	345	365	390	410
22	285	305	330	355	380	405	430	455
23	310	335	360	390	415	445	470	495
24	340	370	395	425	455	485	515	545
25	370	400	430	460	495	525	560	590
26	400	435	470	500	535	570	605	640
27	435	470	505	540	580	615	655	690
28	470	510	545	585	625	665	705	745
29	505	545	590	630	670	715	755	800
30	540	585	630	675	720	765	810	860
31	580	625	675	720	770	820	870	915
32	620	670	720	770	825	875	925	980
33	660	715	765	820	875	930	985	1,045
34	700	760	815	875	930	990	1,050	1,110
35	745	805	865	925	990	1,050	1,115	1,175
36	790	855	920	980	1,045	1,115	1,180	1,245
37	835	905	970	1,040	1,110	1,175	1,245	1,315
38	885	955	1,025	1,095	1,170	1,245	1,315	1,390
39	930	1,005	1,080	1,155	1,235	1,310	1,390	1,465
40	980	1,060	1,140	1,220	1,300	1,380	1,460	1,540
41	1,030	1,115	1,200	1,280	1,365	1,450	1,535	1,620
42	1,085	1,170	1,260	1,345	1,435	1,525	1,615	1,705
43	1,140	1,230	1,320	1,410	1,505	1,600	1,695	1,785
44	1,195	1,290	1,385	1,480	1,580	1,675	1,775	1,870
45	1,250	1,350	1,450	1,550	1,650	1,755	1,855	1,960

TABLE 5.—*International ¼ inch log rule*—Continued

4- TO 12-FOOT LOGS—Continued

Diameter, inches	Length—feet								
	4	5	6	7	8	9	10	11	12
	Volume—board feet								
46	390	490	590	690	795	895	995	1,100	1,200
47	410	515	620	725	830	935	1,040	1,150	1,255
48	430	535	645	755	865	975	1,090	1,200	1,310
49	445	560	675	790	905	1,020	1,135	1,250	1,370
50	465	585	705	820	940	1,060	1,185	1,305	1,425
51	485	610	735	855	980	1,105	1,235	1,360	1,485
52	505	635	760	890	1,020	1,150	1,285	1,415	1,545
53	525	660	795	925	1,060	1,195	1,335	1,470	1,605
54	545	685	825	965	1,100	1,245	1,385	1,530	1,670
55	565	710	855	1,000	1,145	1,290	1,440	1,585	1,735
56	590	740	890	1,040	1,190	1,340	1,495	1,645	1,800
57	610	765	920	1,075	1,230	1,390	1,550	1,705	1,865
58	635	795	955	1,115	1,275	1,440	1,605	1,770	1,930
59	655	820	990	1,155	1,320	1,490	1,660	1,830	2,000
60	680	850	1,025	1,195	1,370	1,545	1,720	1,895	2,070

TABLE 5.—*International ¼ inch log rule*—Continued

13- TO 20-FOOT LOGS—Continued

Diameter, inches	Length—feet							
	13	14	15	16	17	18	19	20
	Volume—board feet							
46	1,305	1,410	1,515	1,620	1,730	1,835	1,940	2,050
47	1,365	1,475	1,585	1,695	1,805	1,915	2,030	2,140
48	1,425	1,540	1,655	1,770	1,885	2,000	2,115	2,235
49	1,485	1,605	1,725	1,845	1,965	2,085	2,205	2,330
50	1,550	1,675	1,795	1,920	2,045	2,175	2,300	2,425
51	1,615	1,745	1,870	2,000	2,130	2,265	2,395	2,525
52	1,680	1,815	1,945	2,080	2,215	2,355	2,490	2,625
53	1,745	1,885	2,025	2,165	2,305	2,445	2,590	2,730
54	1,815	1,960	2,100	2,245	2,395	2,540	2,690	2,835
55	1,885	2,035	2,185	2,330	2,485	2,640	2,790	2,945
56	1,955	2,110	2,265	2,420	2,575	2,735	2,895	3,050
57	2,025	2,185	2,345	2,510	2,670	2,835	3,000	3,165
58	2,100	2,265	2,430	2,600	2,770	2,935	3,105	3,275
59	2,170	2,345	2,515	2,690	2,865	3,040	3,215	3,390
60	2,250	2,425	2,605	2,785	2,965	3,145	3,325	3,510

Instructions for Using Alinement Chart for Obtaining Deductions for Defect with International 1/4-inch Log Rule

1. Measure width and height of defect in inches. Add 1 inch to each to allow for waste.
2. Multiply width by height.
3. Measure or estimate length of defect.
4. Place straightedge through product of *W X H* (left line) and length (right line).
5. Read deduction, to nearest 5 board feet, on center line.

For example, if a defect measured 7″x 8″x 10′, the deduction would be determined by holding the straightedge through 72 on the left line (7″+1″) x (8″+1″) and 10 on the right line. The deduction, center line intersection, is 45 board feet.

CHART FOR DETERMINING DEFECT ALLOWANCE

INTERNATIONAL $\frac{1}{4}$" LOG RULE

$$\text{Board feet} = \frac{W'' \times H'' \times L'}{16} \text{ or } \frac{(D'')^2 L'}{16} \text{ (for Circular Defect)}$$

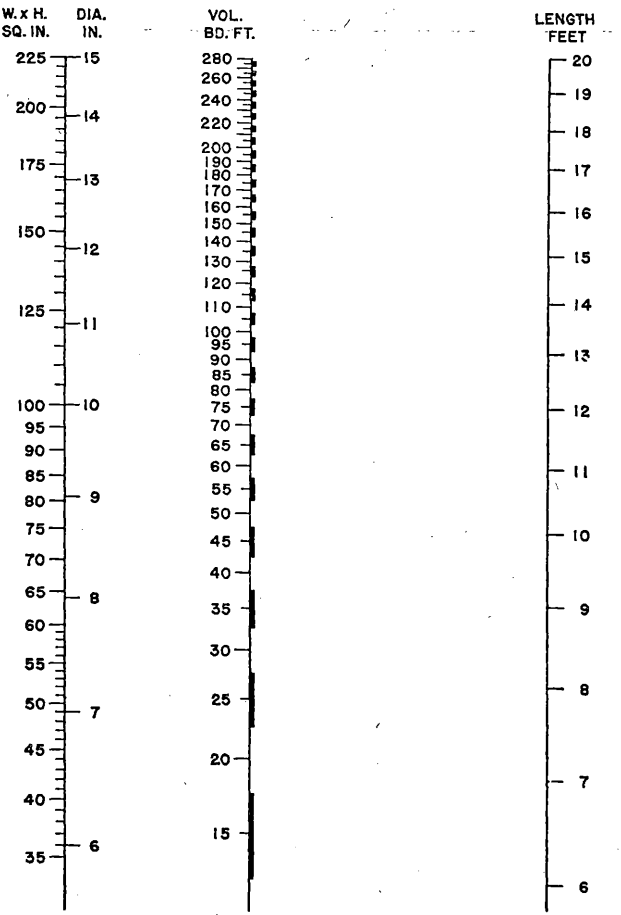

TABLE 6.—*Solid cubic contents of logs*

Length, feet	Average middle diameter—in inches																	
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Contents—in cubic feet																	
4	0.25	0.25	0.5	1	1	1	2	2	3	3	4	4	5	6	6	7	8	9
5	.25	.5	.5	1	1	2	2	3	3	4	5	5	6	7	8	9	10	11
6	.25	.5	1	1	2	2	3	3	4	5	6	6	7	8	9	11	12	13
7	.25	.5	1	1	2	2	3	4	5	5	6	7	9	10	11	12	14	15
8	.5	.5	1	2	2	3	4	4	5	6	7	9	10	11	13	14	16	17
9	.5	1	1	2	2	3	4	5	6	7	8	10	11	13	14	16	18	20
10	.5	1	1	2	3	3	4	5	7	8	9	11	12	14	16	18	20	22
11	.5	1	1	2	3	4	5	6	7	9	10	12	13	15	17	19	22	24
12	.5	1	2	2	3	4	5	7	8	9	11	13	15	17	19	21	24	26
13	.5	1	2	3	3	5	6	7	9	10	12	14	16	18	20	23	26	28
14	.5	1	2	3	4	5	6	8	9	11	13	15	17	20	22	25	28	31
15	.5	1	2	3	4	5	7	8	10	12	14	16	18	21	24	27	30	33
16	1	1	2	3	4	6	7	9	11	13	15	17	20	22	25	28	32	35
17	1	1	2	3	5	6	8	9	11	13	16	18	21	24	27	30	33	37
18	1	2	2	4	5	6	8	10	12	14	17	19	22	25	28	32	35	39
19	1	2	3	4	5	7	8	10	13	15	18	20	23	27	30	34	37	41
20	1	2	3	4	5	7	9	11	13	16	18	21	25	28	32	35	39	44
21	1	2	3	4	6	7	9	11	14	16	19	22	26	29	33	37	41	46
22	1	2	3	4	6	8	10	12	15	17	20	24	27	31	35	39	43	48
23	1	2	3	5	6	8	10	13	15	18	21	25	28	32	36	41	45	50
24	1	2	3	5	6	8	11	13	16	19	22	26	29	34	38	42	47	52
25	1	2	3	5	7	9	11	14	16	20	23	27	31	35	39	44	49	55
26	----	----	----	5	7	9	11	14	17	20	24	28	32	36	41	46	51	57
27	----	----	----	5	7	9	12	15	18	21	25	29	33	38	43	48	53	59
28	----	----	----	5	7	10	12	15	18	22	26	30	34	39	44	49	55	61
29	----	----	----	6	8	10	13	16	19	23	27	31	36	40	46	51	57	63
30	----	----	----	6	8	10	13	16	20	24	28	32	37	42	47	53	59	65
31	----	----	----	6	8	11	14	17	20	24	29	33	38	43	49	55	61	68
32	----	----	----	6	9	11	14	17	21	25	29	34	39	45	50	57	63	70
33	----	----	----	6	9	12	15	18	22	26	30	35	40	46	52	58	65	72
34	----	----	----	7	9	12	15	19	22	27	31	36	42	47	54	60	67	74
35	----	----	----	7	9	12	15	19	23	27	32	37	43	49	55	62	69	76
36	----	----	----	7	10	13	16	20	24	28	33	38	44	50	57	64	71	79
37	----	----	----	7	10	13	16	20	24	29	34	40	45	52	58	65	73	81
38	----	----	----	7	10	13	17	21	25	30	35	41	47	53	60	67	75	83
39	----	----	----	8	10	14	17	21	26	31	36	42	48	54	61	69	77	85
40	----	----	----	8	11	14	18	22	26	31	37	43	49	56	63	71	79	87

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TABLE 6.—*Solid cubic contents of logs*—Continued

Length, feet	Average middle diameter—inches																			
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
	Contents—cubic feet																			
4	10	11	12	13	14	15	16	17	18	20	21	22	24	25	27	28	30	32	33	35
5	12	13	14	16	17	18	20	21	23	25	26	28	30	32	33	35	37	39	41	44
6	14	16	17	19	20	22	24	26	28	29	31	34	36	38	40	42	45	47	50	52
7	17	18	20	22	24	26	28	30	32	34	37	39	42	44	47	49	52	55	58	61
8	19	21	23	25	27	29	32	34	37	39	42	45	48	50	53	57	60	63	66	70
9	22	24	26	28	31	33	36	38	41	44	47	50	53	57	60	64	67	71	75	79
10	24	26	29	31	34	37	40	43	46	49	52	56	59	63	67	71	75	79	83	87
11	26	29	32	35	37	41	44	47	50	54	58	61	65	69	73	78	82	87	91	96
12	29	32	35	38	41	44	48	51	55	59	63	67	71	76	80	85	90	95	100	105
13	31	34	38	41	44	48	52	56	60	64	68	73	77	82	87	92	97	102	108	113
14	34	37	40	44	48	52	56	60	64	69	73	78	83	88	94	99	105	110	116	122
15	36	40	43	47	51	55	60	64	69	74	79	84	89	95	100	106	112	118	124	131
16	38	42	46	50	55	59	64	68	73	79	84	89	95	101	107	113	119	126	133	140
17	41	45	49	53	58	63	68	73	78	83	89	95	101	107	114	120	127	134	141	148
18	43	48	52	57	61	66	72	77	83	88	94	101	107	113	120	127	134	142	149	157
19	46	50	55	60	65	70	76	81	87	93	100	106	113	120	127	134	142	150	158	166
20	48	53	58	63	68	74	80	86	92	98	105	112	119	126	134	141	149	158	166	175
21	51	55	61	66	72	77	83	90	96	103	110	117	125	132	140	148	157	165	174	183
22	53	58	63	69	75	81	87	94	101	108	115	123	131	139	147	156	164	173	183	192
23	55	61	66	72	78	85	91	98	105	113	121	128	137	145	154	163	172	181	191	201
24	58	63	69	75	82	88	95	103	110	118	126	134	143	151	160	170	179	189	199	209
25	60	66	72	79	85	92	99	107	115	123	131	140	148	158	167	177	187	197	207	218
26	63	69	75	82	89	96	103	111	119	128	136	145	154	164	174	184	194	205	216	227
27	65	71	78	85	92	100	107	115	124	133	142	151	160	170	180	191	202	213	224	236
28	67	74	81	88	95	103	111	120	128	137	147	156	166	177	187	198	209	221	232	244
29	70	77	84	91	99	107	115	124	133	142	152	162	172	183	194	205	217	228	241	253
30	72	79	87	94	102	111	119	128	138	147	157	168	178	189	200	212	224	236	249	262
31	75	82	89	97	106	114	123	133	142	152	162	173	184	195	207	219	231	244	257	271
32	77	84	92	101	109	118	127	137	147	157	168	179	190	202	214	226	239	252	265	279
33	79	87	95	104	112	122	131	141	151	162	173	184	196	208	220	233	246	260	274	288
34	82	90	98	107	116	125	135	145	156	167	178	190	202	214	227	240	254	268	282	297
35	84	92	101	110	119	129	139	150	161	172	183	195	208	221	234	247	261	276	290	305
36	87	95	104	113	123	133	143	154	165	177	189	201	214	227	241	254	269	284	299	314
37	89	98	107	116	126	136	147	158	170	182	194	207	220	233	247	262	276	291	307	323
38	91	100	110	119	130	140	151	162	174	187	199	212	226	240	254	269	284	299	315	332
39	94	103	113	123	133	144	155	167	179	191	204	218	232	246	261	276	291	307	324	340
40	96	106	115	126	136	147	159	171	183	196	210	223	238	252	267	283	299	315	332	349

TABLE 6.—*Solid cubic contents of logs*—Continued

Length, feet	Average middle diameter—inches																			
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
	Contents—cubic feet																			
4	37	38	40	42	44	46	48	50	52	55	57	59	61	64	66	68	71	73	76	79
5	46	48	50	53	55	58	60	63	65	68	71	74	77	80	82	86	89	92	95	98
6	55	58	61	63	66	69	72	75	79	82	85	88	92	95	99	103	106	110	114	118
7	64	67	71	74	77	81	84	88	92	95	99	103	107	111	115	120	124	128	133	137
8	73	77	81	84	88	92	96	101	105	109	113	118	123	127	132	137	142	147	152	157
9	83	87	91	95	99	104	108	113	118	123	128	133	138	143	148	154	159	165	171	177
10	92	96	101	106	110	115	120	126	131	136	142	147	153	159	165	171	177	183	190	196
11	101	106	111	116	121	127	133	138	144	150	156	162	169	175	181	188	195	202	209	216
12	110	115	121	127	133	138	145	151	157	164	170	177	184	191	198	205	213	220	228	236
13	119	125	131	137	144	150	157	163	170	177	184	192	199	207	214	222	230	239	247	255
14	128	135	141	148	155	162	169	176	183	191	199	206	214	223	231	239	248	257	266	275
15	138	144	151	158	166	173	181	188	196	205	213	221	230	239	247	257	266	275	285	295
16	147	154	161	169	177	185	193	201	210	218	227	236	245	254	264	274	284	294	304	314
17	156	164	171	180	188	196	205	214	223	232	241	251	260	270	280	291	301	312	323	334
18	165	173	182	190	199	208	217	226	236	245	255	265	276	286	297	308	319	330	342	353
19	174	183	192	201	210	219	229	239	249	259	270	280	291	302	313	325	337	349	361	373
20	183	192	202	211	221	231	241	251	262	273	284	295	306	318	330	342	354	367	380	393
21	193	202	212	222	232	242	253	264	275	286	298	310	322	334	346	359	372	385	399	412
22	202	212	222	232	243	254	265	276	288	300	312	324	337	350	363	376	390	404	418	432
23	211	221	232	243	254	265	277	289	301	314	326	339	352	366	379	393	408	422	437	453
24	220	231	242	253	265	277	289	302	314	327	340	354	368	382	396	411	425	440	456	471
25	229	241	252	264	276	289	301	314	327	341	355	369	383	398	412	428	443	459	475	491
26	238	250	262	275	287	300	313	327	340	355	369	383	398	414	429	445	461	477	494	511
27	248	260	272	285	298	312	325	339	354	368	383	398	414	429	445	462	478	495	513	530
28	257	269	282	296	309	323	337	352	367	382	397	413	429	445	462	479	496	514	532	550
29	266	279	292	306	320	335	349	364	380	395	411	428	444	461	478	496	514	532	551	569
30	275	289	303	317	331	346	361	377	393	409	426	442	460	477	495	513	532	550	570	589
31	284	298	313	327	342	358	373	390	406	423	440	457	475	493	511	530	549	569	589	609
32	293	308	323	338	353	369	386	402	419	436	454	472	490	509	528	547	567	587	608	628
33	303	317	333	348	364	381	398	415	432	450	468	487	506	525	544	564	585	605	627	648
34	312	327	343	359	376	392	410	427	445	464	482	501	521	541	561	582	603	624	646	668
35	321	337	353	370	387	404	422	440	458	477	497	516	536	557	577	599	620	642	665	687
36	330	346	363	380	398	415	434	452	471	491	511	531	552	573	594	616	638	661	683	707
37	339	356	373	391	409	427	446	465	485	505	525	546	567	588	610	633	656	679	702	726
38	348	366	383	401	420	439	458	478	498	518	539	560	582	604	627	650	673	697	721	746
39	358	375	393	412	431	450	470	490	511	532	553	575	598	620	643	667	691	716	740	766
40	367	385	403	422	442	462	482	503	524	545	567	590	613	636	660	684	709	734	759	785

TABLE 7.—*Board-foot contents of standard sizes of timber*

End dimensions, inches	Length of timber—feet							
	10	12	14	16	18	20	22	24
	Contents—board feet							
1 x 2	1⅔	2	2⅓	2⅔	3	3⅓	3⅔	4
3	2½	3	3½	4	4½	5	5½	6
4	3⅓	4	4⅔	5⅓	6	6⅔	7⅓	8
5	4⅙	5	5⅚	6⅔	7½	8⅓	9⅙	10
6	5	6	7	8	9	10	11	12
7	5⅚	7	8⅙	9⅓	10½	11⅔	12⅚	14
8	6⅔	8	9⅓	10⅔	12	13⅓	14⅔	16
10	8⅓	10	11⅔	13⅓	15	16⅔	18⅓	20
12	10	12	14	16	18	20	22	24
14	11⅔	14	16⅓	18⅔	21	23⅓	25⅔	28
16	13⅓	16	18⅔	21⅓	24	26⅔	29⅓	32
18	15	18	21	24	27	30	33	36
20	16⅔	20	23⅓	26⅔	30	33⅓	36⅔	40
1¼ x 4	4⅙	5	5⅚	6⅔	7½	8⅓	9⅙	10
6	6¼	7½	8¾	10	11¼	12½	13¾	15
8	8⅓	10	11⅔	13⅓	15	16⅔	18⅓	20
10	10	12½	14 7/12	16⅔	18¾	20⅚	22 11/12	25
12	12½	15	17½	20	22½	25	27½	30
1½ x 4	5	6	7	8	9	10	11	12
6	7½	9	10½	12	13½	15	16½	18
8	10	12	14	16	18	20	22	24
10	12½	15	17½	20	22½	25	27½	30
12	15	18	21	24	27	30	33	36
2 x 3	5	6	7	8	9	10	11	12
4	6⅔	8	9⅓	10⅔	12	13⅓	14⅔	16
6	10	12	14	16	18	20	22	24
8	13⅓	16	18⅔	21⅓	24	26⅔	29⅓	32
10	16⅔	20	23⅓	26⅔	30	33⅓	36⅔	40
12	20	24	28	32	36	40	44	48
14	23⅓	28	32⅔	37⅓	42	46⅔	51⅓	56
16	26⅔	32	37⅓	42⅔	48	53⅓	58⅔	64
2½ x 12	25	30	35	40	45	50	55	60
14	29⅙	35	40⅚	46⅔	52½	58⅓	64⅙	70
16	33⅓	40	46⅔	53⅓	60	66⅔	73⅓	80
3 x 4	10	12	14	16	18	20	22	24
6	15	18	21	24	27	30	33	36
8	20	24	28	32	36	40	44	48
10	25	30	35	40	45	50	55	60
12	30	36	42	48	54	60	66	72
14	35	42	49	56	63	70	77	84
16	40	48	56	64	72	80	88	96
4 x 4	13⅓	16	18⅔	21⅓	24	26⅔	29⅓	32
6	20	24	28	32	36	40	44	48
8	26⅔	32	37⅓	42⅔	48	53⅓	58⅔	64
10	33⅓	40	46⅔	53⅓	60	66⅔	73⅓	80
12	40	48	56	64	72	80	88	96
14	46⅔	56	65⅓	74⅔	84	93⅓	102⅔	112
5 x 8	33⅓	40	46⅔	53⅓	60	66⅔	73⅓	80

TABLE 7.—*Board-foot contents of standard sizes of timber*—Continued

End dimensions, inches	Length of timber—feet							
	10	12	14	16	18	20	22	24
	Contents—board feet							
6 x 6	30	36	42	48	54	60	66	72
8	40	48	56	64	72	80	88	96
10	50	60	70	80	90	100	110	120
12	60	72	84	96	108	120	132	144
14	70	84	98	112	126	140	154	168
16	80	96	112	128	144	160	176	192
8 x 8	53 1/3	64	74 2/3	85 1/3	96	106 2/3	117 1/3	128
10	66 2/3	80	93 1/3	106 2/3	120	133 1/3	146 2/3	160
12	80	96	112	128	144	160	176	192
14	93 1/3	112	130 2/3	149 1/3	168	186 2/3	205 1/3	224
10 x 10	83 1/3	100	116 2/3	133 1/3	150	166 2/3	183 1/3	200
12	100	120	140	160	180	200	220	240
14	116 2/3	140	163 1/3	186 2/3	210	233 1/3	256 2/3	280
16	133 1/3	160	186 2/3	213 1/3	240	266 2/3	293 1/3	320
12 x 12	120	144	168	192	216	240	264	288
14	140	168	196	224	252	280	308	336
16	160	192	224	256	288	320	352	384
14 x 14	163 1/3	196	228 2/3	261 1/3	294	326 2/3	359 1/3	392
16	186 2/3	224	261 1/3	298 2/3	336	373 1/3	410 2/3	448
18	210	252	294	336	378	420	462	504
16 x 16	213 1/3	256	298 2/3	341 1/3	384	426 2/3	469 1/3	512
18	240	288	336	384	432	480	528	576
20	266 2/3	320	373 1/3	426 2/3	480	533 1/3	586 2/3	640
18 x 18	270	324	378	432	486	540	594	648
20 x 20	333 1/3	400	466 2/3	533 1/3	600	666 2/3	733 1/3	800
22 x 22	403 1/3	484	564 2/3	645 1/3	726	806 2/3	887 1/3	968
24 x 24	480	576	672	768	864	960	1,056	1,152
26 x 26	563 1/3	676	788 2/3	901 1/3	1,014	1,126 2/3	1,239 1/3	1,352
28 x 28	653 1/3	784	914 2/3	1,045 1/3	1,176	1,306 2/3	1,437 1/3	1,568
30 x 30	750	900	1,050	1,200	1,350	1,500	1,650	1,800

End dimensions, inches	Length of timber—feet					
	28	32	34	36	38	40
	Contents—board feet					
8 x 8	149 1/3	170 2/3	181 1/3	192	202 2/3	213 1/3
10	186 2/3	213 1/3	226 2/3	240	253 1/3	266 2/3
12	224	256	272	288	304	320
14	261 1/3	298 2/3	317 1/3	336	354 2/3	373 1/3
10 x 10	233 1/3	266 2/3	283 1/3	300	316 2/3	333 1/3
12	280	320	340	360	380	400
14	326 2/3	373 1/3	396 2/3	420	443 1/3	466 2/3
16	373 1/3	426 2/3	453 1/3	480	506 2/3	533 1/3

TABLE 7.—*Board-foot contents of standard sizes of timber*—Continued

End dimensions, inches	Length of timber—feet					
	28	32	34	36	38	40
	Contents—board feet					
12 x 12	336	384	408	432	456	480
14	392	448	476	504	532	560
16	448	512	544	576	608	640
14 x 14	457⅓	522⅔	555⅓	588	620⅔	653⅓
16	522⅔	597⅓	634⅔	672	709⅓	746⅔
18	588	672	714	756	798	840
16 x 16	597⅓	682⅔	725⅓	768	810⅔	853⅓
18	672	768	816	864	912	960
20	746⅔	853⅓	906⅔	960	1,013⅓	1,066⅔
18 x 18	756	864	918	972	1,026	1,080
20 x 20	933⅓	1,066⅔	1,133⅓	1,200	1,266⅔	1,333⅓
22 x 22	1,129⅓	1,290⅔	1,371⅓	1,452	1,532⅔	1,613⅓
24 x 24	1,344	1,536	1,632	1,728	1,824	1,920
26 x 26	1,577⅓	1,802⅔	1,915⅓	2,028	2,140⅔	2,253⅓
28 x 28	1,829⅓	2,090⅔	2,221⅓	2,352	2,482⅔	2,613⅓
30 x 30	2,100	2,400	2,550	2,700	2,850	3,000

TABLE 8.—*Board-foot contents of railroad ties*

[To nearest whole boardfoot, with no deduction for kerf]

End dimensions, inches	Length—feet		
	Narrow gauge	Standard gauge	
	6½	8	8½
6 x 6	20	24	26
6 x 7	23	28	30
6 x 8	26	32	34
7 x 7	27	33	35
7 x 8	30	37	40
7 x 9	----------	42	45

TABLE 9.—*Standard converting factors*

Product	Assumed dimensions	Equivalent in board feet
Cord, standard	4 by 4 by 8 feet	500
Cord, long	4 by 5 by 8 feet	625
Cord, shingle bolts	4 by 4 by 8 feet	600
Cord, small material (averaging less than 5 inches middle diameter in the round)	do	333⅓
Cord, short	4 by 3 by 8 feet	375
Cord, short, small material	do	250
Load (small, irregular pieces that can not be ricked)	4 by 4 by 8 feet	333⅓
Tie, standard	7 by 9 inches by 8 feet	35
Do	7 by 8 inches by 8 feet	30
Do	6 by 6 inches by 8 feet	20
Tie, narrow gauge	7 by 8 inches by 6½ feet	25
Do	6 by 7 inches by 6½ feet	20
Do	6 by 6 inches by 6½ feet	15
Pole (telephone) or piling	8 inches by 45 feet	200
Do	8 inches by 40 feet	150
Do	8 inches by 35 feet	100
Do	7 inches by 60 feet	280
Do	7 inches by 50 feet	200
Do	7 inches by 40 feet	100
Do	7 inches by 35 feet	80
Do	7 inches by 30 feet	60
Do	7 inches by 25 feet	50
Do	5 inches by 25 feet	30
Cubic foot	13.6 inches by 1 foot	6
Linear foot	10 inches by 1 foot	3
Linear foot (long pliing)	80 to 125 feet by 6 inches	5⅓
Derrick pole	7 inches by 30 feet	60
Derrick set (11 pieces)		480
Post, fence	6 inches by 7 feet	7
Do	5 inches by 7 feet	5
Post, split	18 inches circumference by 7 feet	6
Brace, fence	4 inches by 6 feet	2
Stake, fence	3 inches by 5 feet	1
Stay, fence	2 inches by 6 feet	½
Rail, fence (split)	20 inches circumference by 16 feet	15
Pole, fence	4 inches by 20 feet	10
Pole (12 pieces)	4 inches by 16 feet	100
Pole, converter	4 inches by 20 feet	10
Prop	6 inches by 10 feet	10
Lagging (6 pieces)	3 inches by 6 feet	10

CONVERTING FACTORS

For convenience in preparing statistics, such as reports of timber cut and sold, and for price determinations in sales under regulation S–22 for products for which prices have not been established by the Chief, it is necessary to convert other products than saw timber into feet board measure. Regional foresters will establish converting factors by forests for these purposes. It is often possible and desir-

able to establish a converting factor for all standard-gage hewn ties cut on a given forest based on the size of the average tie; and similar factors are often applicable to groups of sizes of telephone poles, piling, or posts. Standard conversion factors established by regional foresters will not be inconsistent with table 9, which will be used in the absence of approved local tables.

TABLE 10.—*Taper*

[For scaling in maximum lengths of 16 feet]

Total length, feet	Log length			
	Butt log	Second log	Third log	Top log
18	10′			8′
Increase	1″			0″
20	10′			10′
Increase	1″			0″
22	12′			10′
Increase	1″			0″
24	12′			12′
Increase	1″			0″
26	14′			12′
Increase	1″			0″
28	14′			14′
Increase	2″			0″
30	16′			14′
Increase	2″			0″
32	16′			16′
Increase	2″			0″
34	12′	12′		10′
Increase	3″	1″		0″
36	12′	12′		12′
Increase	3″	1″		0″
38	14′	12′		12′
Increase	3″	1″		0″
40	16′	12′		12′
Increase	3″	1″		0″
42	14′	14′		14′
Increase	3″	1″		0″
44	16′	16′		12′
Increase	3″	1″		0″
46	16′	16′		14′
Increase	4″	2″		0″
48	16′	16′		16′
Increase	4″	2″		0″
50	14′	12′	12′	12′
Increase	4″	3″	1″	0″
52	16′	12′	12′	12′
Increase	4″	3″	1″	0″
54	16′	14′	12′	12′
Increase	5″	3″	1″	0″
56	16′	16′	12′	12′
Increase	5″	3″	1″	0″
58	16′	16′	14′	12′
Increase	5″	3″	2″	0″
60	16′	16′	14′	14′
Increase	5″	3″	2″	0″

Table 10 is intended to be used simply as a guide; the allowances for taper shown in this table should be varied to conform to the *actual taper.*

TABLE 11.—*Taper*

[For scaling in maximum lengths of 40 feet]

Total length, feet	Log length			
	Butt log	Second log	Third log	Top log
42	22′			20′
Increase	2″			0″
44	22′			22′
Increase	2″			0″
46	24′			22′
Increase	2″			0″
48	24′			24′
Increase	3″			0″
50	26′			24′
Increase	3″			0″
52	26′			26′
Increase	3″			0″
54	28′			26′
Increase	3″			0″
56	28′			28′
Increase	3″			0″
58	30′			28′
Increase	4″			0″
60	30′			30′
Increase	4″			0″
62	32′			30′
Increase	4″			0″
64	32′			32′
Increase	4″			0″
66	34′			32′
Increase	5″			0″
68	34′			34′
Increase	5″			0″
70	36′			34′
Increase	5″			0″
72	36′			36′
Increase	5″			0″
74	38′			36′
Increase	6″			0″
76	38′			38′
Increase	6″			0″
78	40′			38′
Increase	6″			0″
80	40′			40′
Increase	6″			0″
82	28′	28′		26′
Increase	7″	5″		0″
84	28′	28′		28′
Increase	8″	5″		0″
86	30′	28′		28′
Increase	8″	5″		0″
88	30′	30′		28′
Increase	8″	5″		0″

TABLE 11.—*Taper*—Continued

[For scaling in maximum lengths of 40 feet]

Total length, feet	Log length			
	Butt log	Second log	Third log	Top log
90	30′	30′		30′
Increase	8″	6″		0″
92	32′	30′		30′
Increase	8″	6″		0″
94	32′	32′		30′
Increase	8″	6″		0″
96	32′	32′		32′
Increase	9″	6″		0″
98	34′	32′		32′
Increase	9″	6″		0″
100	34′	34′		32′
Increase	9″	6″		0″

Table 11 is intended to be used simply as a guide; the allowances for taper shown should be varied to conform to the actual taper.

RULES OF THUMB FOR DEFECT DEDUCTION

Rules of Thumb.

It will be the standard practice in Forest Service scaling to use the standard rule, page 19 (see tables 3 and 4), in deducting for interior defects. For deducting for center and circular rot, regional foresters may, however, approve the use of other rules—such as the three rules of thumb given below—by scalers who have the requisite judgment and experience.

(1) Obtain the average diameter of the rot. Add to the average diameter—

One half, if it is 9 inches or less.

One-third, if it is from 10 to 19 inches, inclusive.

One-fourth, if it exceeds 19 inches.

Obtain the scale of a log of this diameter, as extended, and of the same length as the log in question. Deduct this amount from the gross scale of the log.

(2) In the case of 14- or 16-foot logs only, the deduction for circular rot of 8 inches in diameter or less can be obtained by squaring the diameter of the defect in inches and rounding off to the nearest multiple of 10. If the average diameter is 7 inches, for example, its square

would be 49, or rounded off, 50 board feet. (Read as 5 in Scribner decimal C log rule.)

(3) For center defects not over 17 inches in diameter, allow twice the scale of a log having the length and diameter of the defect. Within the size limitation indicated, this rule will give results very similar to the use of the standard rule. It should not be used for defects over 17 inches in diameter.

It should be kept in mind that in measuring the diameter of the defect under the rules of thumb, the measurement should be taken in the same manner as it would be taken in applying the standard rule in the region concerned.

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